ELECTRICAL REVIEW

22nd MAY, 1953

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VOL. CLII: No. 21
Fridays: Price 1/-

EDITORIAL, ADVERTISING & PUBLISHING OFFICES: Dorset House, Stamford Street, London, S.E.1. Telegraphic Address: "Elecrev, Sedist, London." Code: ABC. Telephone No. Waterloo 3333 (60 lines). Entered as Second Class Matter at the New York, U.S.A., Post Office. Annual Subscription: Home and Overseas £3 6s 0d: U.S.A. and Canada $11.00. Cheques & P.O.s (on Chief Office, London) payable to ELECTRICAL REVIEW PUBLICATIONS LTD., and crossed "Lloyds Bank."

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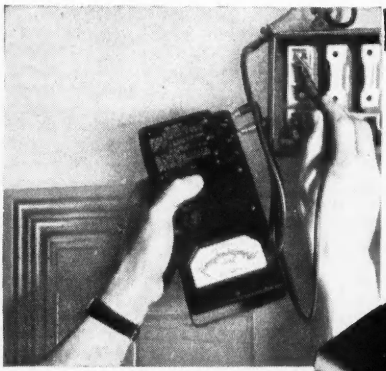

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ELECTRICAL REVIEW

22nd MAY, 1953

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Insulating Materials

OUTSTANDING among the subjects for gainful research, both fundamental and applied, are electrical insulants of all kinds. The need for further knowledge becomes more apparent as the growth in the use of electricity entails the adoption of ever-increasing voltages. High resistivity, once the main criterion, is now only one of a host of electrical qualities, which in their turn often have to be subordinated to such manufacturing requirements as mechanical strength. Each type of equipment over the wide electrical range, e.g., from heavy rotating plant to cables, brings its own problems. An idea of the investigatory work that these entail was to be obtained from the recent three-day symposium on insulating materials arranged by the Measurements Section of the Institution of Electrical Engineers and the Supply Section lecture by Mr. L. J. Davies.

At the present stage of development no general rules can be established for correlating the vast amount of apparently unrelated phenomena observed in experiments related to different branches of the work. The meetings furnished evidence, however, of steady advance in the attainment and exploitation of fresh knowledge. By far the greatest number of electrical failures are due to insulation breakdowns, which can be classified in five or possibly seven categories. Such breakdowns lent some kind of unifying theme to the discussions, and Col. B. H. Leeson (President, I.E.E.) focused attention on the primary requirement that insulating materials must withstand not only normal voltages under an extended range of working temperatures but also abnormal conditions found in service over a long life. More complete understanding of the mechanism of breakdowns is also necessary to permit the raising of working stresses in the future as a step towards further economy. As a means of increasing temperature range the use of silicones, in which some of the carbon of organic compounds is replaced by silicon, offers considerable promise. For making the utmost use

of material the British invention polythene, among its many merits, has opened a new era in telephony. In all the foregoing the importance of advances in measuring instruments coupled with facilities for prolonged tests under commercial load cycles can hardly be overestimated. With the continual introduction of new insulants and developments in the technique of applying them, progress appears likely at an accelerating rate towards a condition in which insulating material will be manufactured to meet the needs of particular duties rather than one in which the most is made of what materials may happen to lie ready to hand.

COAL AND ELECTRICITY

An indirect tribute to the generating efficiency of the British Electricity Authority is included in the 1952 report of the National Coal Board. It is said that in 1952 sales of electricity are estimated to have increased by 4 per cent but the Authority used only 0·9 per cent more coal. Efficiency of production was not so marked in the coal-mining industry for although the labour force increased by 2·4 per cent the output was only 1·6 per cent higher. This is attributed to the greater numbers of untrained workers in the industry and the greater number of development shifts worked. Costs continued to rise and, in spite of the 5s a ton price increase made at the end of 1951, the Board incurred a deficit of £8·2 million. Prices have since been further increased and the result is becoming apparent from the announcements by Area Boards of higher charges for electricity.

APPLIED SCIENCE

The urgent need to increase the number of applied scientists referred to in the report of the Council of the Institution of Electrical Engineers summarized in our last issue was given further emphasis by Sir William Stanier at the dinner of the Institution of Engineers-in-Charge which we report this week. Steps so far envisaged in regard to the universities seem of doubtful adequacy. They require to be supplemented by greater facilities for technological education in addition to normal technical studies in extra-mural colleges.

LOOSENING THE BONDS

All friends of the Electrical Development Association will be gratified to note from the Council's report for 1952 that a change from the passive to the active is in progress. This, of course, applies mainly to domestic development, for in other directions—particularly in the industrial field—E.D.A. has been very busy: the report provides sufficient evidence of this. While the solid-fuel interests have been allowed full play for their selling propaganda electricity has been held back, with serious results to the electrical industry. The time has certainly arrived for ending this intolerable discrimination.

MANUFACTURE IN INDIA

The endeavours of some of its most important customers to satisfy their own requirements constitute one of the problems confronting the British electrical industry. Australia and South Africa are prominent in this movement and India is following their example. Telephone equipment, batteries, fans and lamps are among the classes which are being made there and now the Government has decided that it is necessary to set up a factory to produce heavy electrical equipment. The Planning Commission is to provide Rs. 7 crores (£5·25 million) for this project and a sum of Rs. 10 lakhs (£75,000) has been included in the 1953–54 Budget of the Government of India for the preparation of a project report on the subject.

Heat Treatment Furnaces

Comparisons of Electrical Equipments Used in the Steel Industry

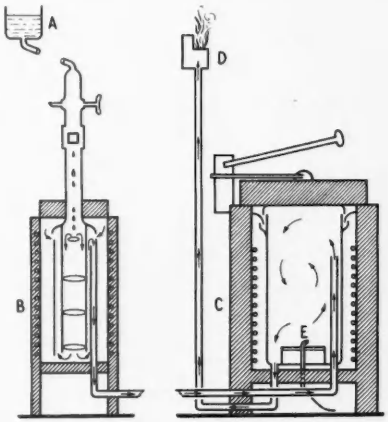
By ALAN J. BLACKWELL*

FROM the viewpoint of industrial applications no doubt the electric heat treatment furnaces which use controlled atmosphere are of the greatest interest. They differ widely both in capacity and design and are usually provided with some special feature considered essential to the production on an economic scale of the desired metallurgical properties of the articles to be manufactured. It need not be stressed here how great is the affinity of iron and oxygen, especially at high temperatures when the chemical reaction becomes rapid. In nearly all the methods available for overcoming this difficulty, with the exception of certain salt bath treatments, a mild carburizing of the skin takes place during this operation.

One of the best known furnaces for heat treating finished machined parts is the American originated " Hump-Vapo-Carb " furnace. It is essentially a cylindrical furnace with the resistance spirals on the outside of the chamber, thus preventing the heat input from coming into direct contact with the work to be treated. The controlled atmosphere is brought about by the introduction of a hydro-carbon gas which is continually fed into the working chamber at a constant saturation rate, excess of this gas being allowed to escape and burn at the mouth of an exhaust tube. The furnace is pyrometrically controlled to an accuracy of ± 5 deg C.

The success of this furnace depends mainly on the " cracking unit," a cylindrical component packed with charcoal which is electrically heated to a temperature of 820 deg C by means of spiral elements. The manufactured gas (atmosphere) is extracted from a liquid called " vapour-carb " which is rich in hydro-carbon. The liquid is held in a reservoir from which it is allowed to fall into the cracking unit by a regulated drop-wise flow. The liquid falls on to a circular disc (the target) and is sprayed over the edges into a column of charcoal. Dissociation is thus achieved and the converted gaseous material is allowed to percolate through two more layers of charcoal and into the main through which it is conducted to the furnace proper. The chief advantages of this type of furnace are that the work suffers no damage from oxidation, that the surfaces of machined parts are in no way affected after treatment, and that distortion of parts of intricate design is reduced to the minimum, partly because the mild steel cylindrical shell which is set centrally in the element spiral introduces the heat input on a similar system to that of the h.f. coreless induction furnace, so that the radiation of heat is constant through the whole of the interior, and thermal gradients are eliminated.

* Chief Metallurgist, Edward Pryor & Son, Ltd.

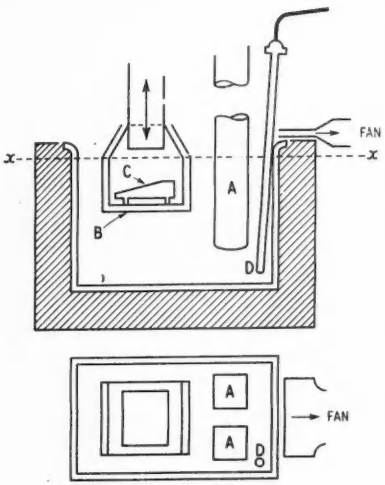


Diagrammatic representation of " Hump-Vapo-Carb " controlled atmosphere furnace for finished machined components: A, liquid vapour carb ; B, cracking unit ; C, hump furnace ; D, exhaust pipe ; E, pyrometer

To these ends a commonsense approach is necessary during the working of the furnace. For example, the lid to the furnace must fit properly and when closed must be sealed with a covering of sand in order to prevent draughts entering the reheating zones. Further, due attention must be paid to the cracking unit to ensure the correct balance of gas to keep the atmosphere inert. With all steel heat treated in this furnace there is a slight carbon absorption on the outer surfaces, but metallurgical tests show that this feature is not detrimental to the work providing the times and temperatures of treating are carefully controlled.

The electric salt bath furnace utilizes liquid salts which are heated and maintained at an even working temperature by two electrodes which are constantly immersed in the bath. The main operational characteristic is high output to which end further advantages are attained by using it on a shift system. The heat input is governed by normal electrical technique and the voltage is controlled to within $\pm$ 5 deg C by normal transformer tapping. Incorporated in the salt bath is a fixed immersion pyrometer.

The salts used are dependent upon the type of work being treated and the choice of these can be made from a very wide range. Most of the manufactured salts are of a carburizing nature, the extent of this being governed by the various mixtures and compounds used. Most of the salts used, especially those in the temperature range 700 to 850 deg C, are of a cyanide base. One of the chief advantages of this particular type of furnace is its adaptability of application—hardening, skin hardening, or carburizing. The work is placed on a tray and then lowered into the liquid salt by means of a simple skip and hoist equipment. Unfortunately, owing to the position of the electrodes, a temperature gradient occurs over the bath area, but this can be overcome by the constant lifting and lowering of the tray in the salt to assist in the equalization of the temperature. Temperature gradients can also be overcome by the use of three electrodes set in a circle 120 deg apart, so that radiation from the arcs takes the form of a triangle, and because of the curved surface of the bath wall heat reflections are in a fan-wise direction. The design of the bath and the electrode positions helps to create a salt current movement similar to that of the eddy currents in the h.f. melting furnace.



Layout principle of electrode salt bath furnace : A, electrodes ; B, skip equipment ; C, work tray ; D, pyrometer ; xx, salt level

Essentially the furnace consists of a good quality mild steel shell, a furnace chamber of high quality refractory material and suitable heat insulating material packing to prevent heat losses. The whole unit is cylindrical in design and mounted on rollers, and a fume extractor and hood cover the top of the furnace.

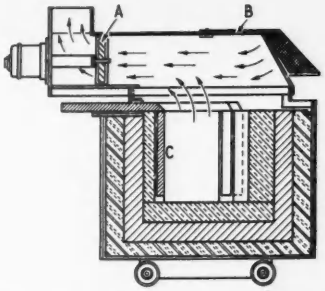
The salt bath furnace is readily adaptable to high temperature work in the range of from 1,100 to 1,350 deg C, which is associated with the heat treatment of high speed steel. For temperature indication in high temperature work a fixed focus radiation pyrometer is used, consisting of a lens which is focused on to the surface of the molten salt. The thermocouple in the receiving tube is connected to an indicator with a suitable scale and is calibrated at from 800 to 1,600 deg C. When reading the instrument the emissivity factor must be considered, because the surface of the liquid salt is not a true black body and is actually at a slightly lower temperature than the rest of the salt. The high temperature and corrosive action of the salt make it impossible to employ an immersion pyrometer but check readings can be made from time to time in order to ensure correct heat treatment temperatures. With working

temperatures below 1,000 deg C, the corrosive action of the salt is not so severe and an immersion pyrometer protected by a suitable sheath can be successfully used.

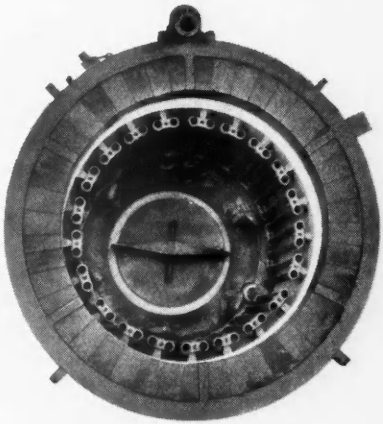
When starting from cold with a new furnace quite a large amount of salt is absorbed into the furnace refractories; this continues until a balance is attained in the brickwork and then the bath will remain constant in volume. One of the chief precautions necessary with this type of furnace is to watch the position of the charge in the liquid salt, because if the work is placed directly by the side of one of the electrodes the material will become overheated and possibly get burnt. It is therefore essential to suspend the work in a suitable basket holder in the centre of the furnace.

Furnaces designed specifically for the tempering of hardened steel work at a much lower service temperature than those of the hardening type, and their temperature range is usually between 100 and 350 deg C, except when tempering high speed steel when the range is between 500 and 560 deg C. The tempering process is a means of releasing the highly developed stresses that are locked in the hardened matrix of the steel. These stresses are not always evenly dispersed and they may vary considerably from crystal to crystal. Hence this operation is very delicate and must be carried out correctly to avoid a softening effect in the material being treated.

The most popular type of electric tempering furnace appears to be that with forced air circulation. An example of this type of furnace is cylindrical and comprises a mild-steel shell with refractories made specially to fit inside. Immediately inside the refractories is the cylindrical vertical element assembly, and finally inside this stands the work basket. Under the grill at the bottom inside the chamber is a fan which is driven by an electric motor housed outside the shell. The fan must be balanced perfectly to circulate the air in a correct cycle. At the top of the furnace chamber a collar in the form of a grid at an inclined angle provides further air space when the lid of the furnace is closed. The furnace is thermostatically and pyrometrically controlled to an accuracy of $\pm$ 5 deg C. The desired temperature is chosen on the dial while the furnace is empty, the electricity supply is switched on, while the elements, which are arranged in two individual



Temperature gradients can be overcome in a salt bath furnace by setting three electrodes equidistant in a circle: A, fume extractor; B, hood; C, electrodes



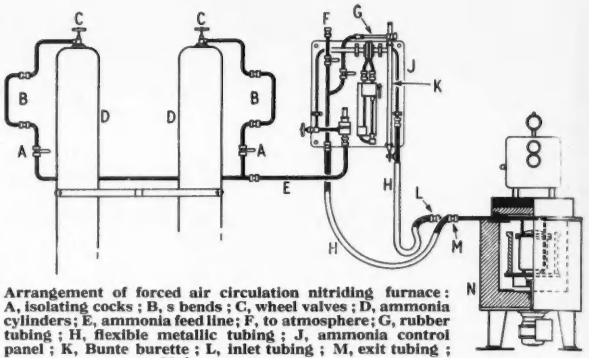
Element assembly and circulating fan inside forced air circulation furnace; work basket removed

circuits, can be alternated to bring on either full or half heat. Closing the furnace lid seals the volume of air in the furnace and air circulation is started up by the electric fan at the bottom of the chamber. The tempering temperature is usually attained in about half an hour. For higher temperatures, however, a corresponding increase in time is made. The cold charge is then placed in the furnace and a period of a quarter of an hour is allowed to bring about equalization.

An important feature of this furnace is the sealing off from the atmosphere, as only the volume of air inside the furnace is being utilized. Another necessity which must be

observed is the position of the work being tempered, which must be placed in the furnace chamber so as to allow free circulation of the hot air throughout the charge.

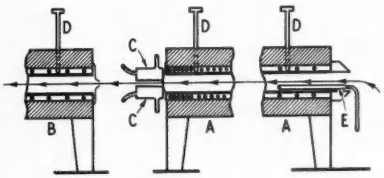
Forced air circulating furnaces can also be used for nitriding, a process in which machined parts are superficially hardened and the work is heated to about 500 deg C for 40 to 90 hours in an atmosphere of ammonia gas. At this temperature the gas is fed into the furnace chamber by means of the circulating fan, and on entering the gas dissociates and part of the nitrogen is liberated in atomic form and attracted by the iron to form on the surface an iron nitride, Fe_4N.



Arrangement of forced air circulation nitriding furnace: A, isolating cocks; B, s bends; C, wheel valves; D, ammonia cylinders; E, ammonia feed line; F, to atmosphere; G, rubber tubing; H, flexible metallic tubing; J, ammonia control panel; K, Bunte burette; L, inlet tubing; M, exit tubing; N, furnace proper

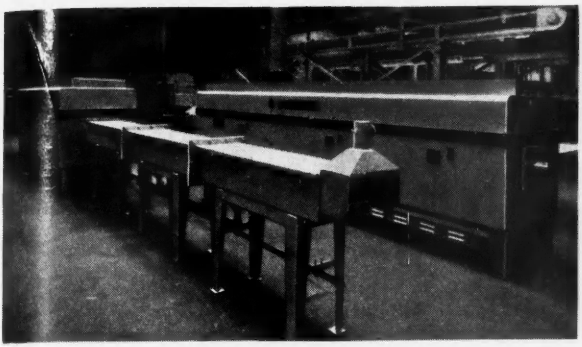
But the process cannot be adopted for all steels; for example, ordinary carbon steel would tend to become very brittle, while steels in the chromium molybdenum and aluminium classes, collectively known as "nitralloy steel," lend themselves to this type of treatment. The general furnace design is identical with that of the tempering furnace, but the whole set-up provides additional equipment for supplying and exhausting ammonia gas which is let into the furnace chamber at a given pressure.

There are various other types of electric tempering furnaces which are used in connection with low temperature salts and mineral oil. These are effective and do their job, but after-treatment is invariably necessary for the purpose of removing the salt and the oil, whereas in the case of the forced air circulation furnace the work leaves the furnace dry and clean and ready for use without any further operations.



General construction of hardening and tempering furnace: A, hardening section; B, tempering section; C, quenching apparatus; D, pyrometers; E, gas supply

Continuous furnaces are used largely in connection with the cold rolling of strip steel. All high carbon rolled strip is usually hardened and tempered as a final operation, and great attention must be paid to the finish; there must be no decarburization or scaling of the cold rolled surfaces in the finished stage. These furnaces vary in length from about 15ft to 30ft, and they are usually worked in pairs, the first furnace serving for the actual hardening and the second for tempering. The furnace chambers vary somewhat in design, some being tubular while others are of arch shape section with a flat bottom. The design of the furnace chamber influences the winding and position of the heating elements. With the hardening furnace the elements are so wired as to give the maximum heat radiation at one particular point, this being at the exit end. The limitations set present a very difficult problem especially as the strip in coil form passing through the heating chamber (tunnel) tends to draw the atmosphere along with it into the heated zones. To overcome this a metal gas tube is usually introduced at the ingoing end and this is allowed to extend a few feet so that a sheet of flame covers the cross section of the heating chamber and acts as a gas curtain. This action takes place in the cold zone of the furnace, hence the strip on entering and travelling up to the curtain is not materially affected on its surfaces. The burning gas which forms



Bank of (tunnel) furnaces for hardening and tempering

a curtain thus combines with the incoming air and prevents its passage to the hot zones of the furnace and consequently the atmosphere is kept neutral.

It is customary in this class of work to harden and temper in one complete operation, and this is achieved by the continuous system in which two furnaces are linked together. Quenching apparatus is attached to the exit end of the hardening furnace, and immediately after this comes the tempering furnace which is very similar in design but works at a much lower temperature than that of the hardening furnace. The furnace chambers are usually made of first class refractory material and in some cases are even constructed of cast heat resisting metal. The tubular furnaces are usually wound on the outside of the inner tube which has a spiral grooved former to accommodate the element wire. The distance between the grooves will of course govern the heat input at that particular point, and this is so worked as to give maximum heat radiation at the point where it is specifically required. This being an hardening process, the maximum amount of heat is required just before the quenching operation; consequently the element windings are much closer at this point.

The element units of the arch section furnace are usually slung between refractory materials of suitable design both under the floor and over the arch exterior. The number of turns in each coil is dependent on the heat output required, and the coiling will be closer at the quenching end of the furnace. In the tempering furnace the temperature is usually kept constant from end to end, thus ensuring that the hardened strip is fully relieved of internal stresses set up during the hardening process. The success of this type of furnace depends on two main factors — the design and graded heat input in the hardening furnaces, and the speed at which the strip moves through the furnace. These factors are variables which have to be adjusted from time to time and according to the section and size of the strip being treated. As in all previously mentioned furnaces these are pyrometrically controlled, but a series of pyrometers are set in different positions so that accurate readings can be taken along the full length of the muffle tube.

Having dealt very briefly with a few electric furnaces which are used in the general sequence of metallurgical operations, it seems appropriate to list those furnaces that have not been mentioned so as to stress the magnitude of the electrical heating applications in the metallurgical industries. These may be classified as follows: box-type; carburizing; continuous furnaces for slab and billet heating; slat conveyor furnaces for heat treating blanks, forgings and pressings; gravity feed furnaces; roller hearth; mesh belt conveyor; rotary hearth; bright annealing; bogie hearth; nitriding (other than those used with the tempering furnace); vertical furnaces for heating shafts, tubes, etc.; high-frequency coil furnaces; and low temperature ovens and drying plant.

From the above it is obvious that we have only touched the surface of a vast field of activity in which each particular division demands a specialist's knowledge. Broadly an outstanding asset of electric heating to the metallurgist is its " composition." Here is a source of heat quite different from all the others. It is clean, free from impurities and it can constitute a very flexible source. The aim, of course, is to attain maximum efficiency and there have been great moves in this direction. For example, salt bath furnaces of the electrode type

need special attention and the relative positions of the electrodes in the bath determine whether or not temperature gradients will occur. Again, the forced air circulating furnace demands first class bearings made to withstand high temperature service if the unit is to function properly. Further, the muffle furnace, which is not specifically mentioned in this article because of its popularity, must not show temperature irregularities on the hearth, otherwise these will be transferred to the material being heat treated. Such features may sometimes appear insignificant to the electrical engineer, but to the metallurgist they represent serious problems.

The modern steels and special irons which are manufactured to-day present many problems in heat treatment. Moreover temperature has to be controlled within narrow limits and must never exceed $\pm$ 5 deg C over a range between 100 deg C and 1,300 deg C, a very small margin, indeed, especially for shop floor work. Distortion of steel components after heat treatment is a feature which constantly presents difficulties. In some cases the design of the component is very often the cause, but, on the other hand, incorrect positioning of heating elements and the design of the furnace may lead to similar results.

The author is well aware that he has dealt only superficially with a very broad subject, and that numerous other examples could have been quoted, but he hopes to include further examples later in the treatment of more specialized aspects of the broader subject.

Due acknowledgments are made of the co-operation of Imperial Chemical Industries, Ltd., and Wild-Barfield Electric Furnaces, Ltd., for co-operation in the preparation of this article, and the permission of the latter company to reproduce some of the illustrations, including those of the tempering and the electrode high temperature salt bath furnaces.

The acknowledgment at the end of Mr. Blackwell's article on "Electric Melting Furnaces" in our issue of 8th May should have been to G.W.B. Electric Furnaces, Ltd., and not Wild-Barfield Electric Furnaces, Ltd.

Coal Board's Report

Progress of Electrification

LAST year the output of coal by the National Coal Board was 226·4 million tons (against 222·9 million in 1951) and the number of workers averaged 716,000 (against 699,000) including 294,000 face workers (287,000). The production cost rose from 49s 2d/ton to 56s 9d/ton and the financial result was a deficit of £8·2 million (against £1·8 million), raising the accumulated deficit to £14·0 million.

Sales during 1952 to the electricity supply industry totalled 35,513,000 tons, as compared with 35,435,000 tons in 1951. The gas industry took 27,700,000 tons (against 27,355,000 tons).

The Board's report deals, division by division, with colliery developments in hand and projected. Part of the £1 million being spent on the Fishburn Colliery (Durham Division) will be for electrification. At Mid-Cannock and Leacroft (West Midlands Division) the coal will be raised by new electric winders. In the same Division there will also be new electric winding gear at Baddesley Colliery and the surface plant at Hamstead is to be electrified.

At Cwmtillery Colliery (South Western Division) there will be surface electrification and new winders. In the Kent Division one of the shafts at Tilmanstone will be deepened and a Kolpe electric winder installed.

The report says that economy in fuel consumption is being striven for, partly by eliminating the direct use of steam at collieries and electrifying the plant.

Between 1947 and 1951, 25 new electric winders were installed and 19 steam winders were converted to electric drive. In 1952 a further 26 electric winders were installed and six steam-driven engines were converted. As part of a joint plan the British Electricity Authority and the Board continued to consider where pit-head power stations, to use low-grade coal, might be built and the Board is already planning a station at Grimethorpe.

Dealing with underground transport the report says that although most of the 500 or so locomotives delivered by the end of 1952 were diesel-operated, battery locomotives are simpler in design and thus easier to maintain. Now that more powerful types are being developed they may be used on an increasing scale as time goes on.

Geometry of the Unbalanced Star

By
E. WILKINSON, Ph.D.*

A Simplified Graphical Solution

SEVERAL graphical solutions of the unbalanced star-connected three-phase circuit have already been published. Mr. Freeman[1] obtains his solution by applying the electrical principle known as Thevenin's theorem. Dr. Tasny-Tschiassny[2] uses the fact that the vector sum of the currents is zero to derive an equation relating the star-point potential to the line potentials and the phase admittances and to provide a particularly simple solution. Mr. Mackay[3] employs the same equation but considers the mechanical analogue of equivalent masses supported at the corners of the voltage triangle. My own method[4] illustrates the geometrical device of allowing in turn two degrees of freedom to the impedance data, thus causing the star point to wander over different circular paths, both of which contain the star point for the given data so that the star point must lie at a point of intersection of these loci.

The construction described in the present article is a development and simplification of my earlier method, and it is about as economical of construction lines as may be expected in a problem of this nature.

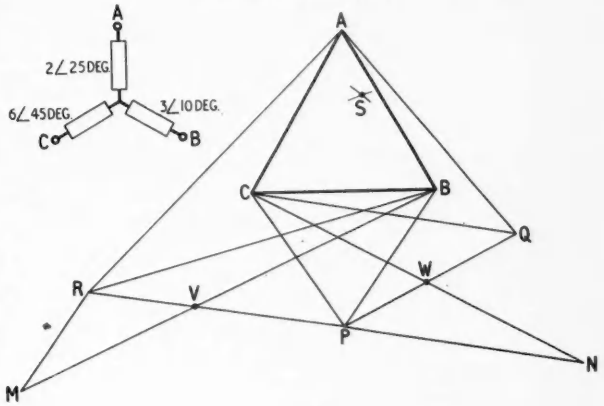
Consider an unbalanced star circuit (Fig. 1) connected to a symmetrical supply ABC. The decisive quantities, which fix the position of the star point, are not the individual impedances, in general Z_a/α; Z_b/β; Z_c/γ, but rather the ratios of the impedances and the differences between the phase angles (in the first example $Z_c/Z_b=2$; $Z_a/Z_c=\frac{1}{3}$; $Z_b/Z_a=\frac{3}{2}$ and $\alpha-\beta=15$ deg; $\beta-\gamma=-35$ deg; $\gamma-\alpha=20$ deg).

The ohmic values of the impedances in the B and C phases are allowed to vary in turn, with the result that the star point traces out a circle in each case. One of the points where these circles intersect is the star point. The centres V and W of the locus circles are found by a new construction.

Draw AR and BR so that $\hat{BAR}=\hat{ABR}=75$ deg and to meet at R. Then $\hat{ARB}=2(15 \text{ deg})$ or in general $2(\alpha-\beta)$. The points P and Q are found similarly, though it should be noted that since $(\beta-\gamma)$ is

* Head of the Electrical Department, Robert Gordon's Technical College, Aberdeen.

Fig. 1.—Complete construction for the location of star point S of a symmetrical supply ABC



negative the point P will lie on the "outside" of the side BC, whereas R and Q lie on the "inside" of the sides AB and CA respectively.

So far the construction follows the earlier method, but its completion is much shorter. It may be shown that the centre V of the circle, which is the locus of the star point as Z_b is varied, lies on RP; in other words RP is the locus of the point V for all values of the impedance ratio Z_a/Z_c. Similarly the point W lies on PQ and the third centre, if desired, is found to lie on QR. That is the point U, which is the centre of the locus when Z_a is varied. It is not essential and is omitted from the construction of Fig. 1, though it is shown for completeness in the second example (Fig. 2).

The position of V on RP for the given data may be found quite simply. Draw RM parallel to BP. Mark a distance RM equal to (Z_a/Z_c)BR. In this example RM=$\frac{1}{3}$ BR. Join MB and let it cut RP at V, which is the required point.

The point W may be found similarly: a line PN is drawn parallel to CQ and PN is made equal to (Z_b/Z_a)CP, or in this example $\frac{3}{2}$ CP. Join NC to cut PQ at the required point W. (The construction is similar for the point U.)

The star point is now found by drawing arcs with centre V and radius VB, and with centre W and radius WC respectively. These circles intersect at the star point S and at one other point. The latter is easily recognized as spurious since all three currents have the same time phase.

The construction of Fig. 1 contains all essential but no superfluous lines. Whatever construction is used there will be occasions when lines intersect at acute angles thus tending to inaccuracy in fixing the point of intersection. In such cases it may be well to check the points by alternative methods. For instance, the position of P may be checked by drawing the perpendicular bisector of CB on which it lies.

It may sometimes be advisable to determine the position of U in addition to those of V and W for the same reason. The star point is then located by the point of intersection of three arcs instead of two (see Fig. 2). A further check is then possible because the points U, V and W must lie on a straight line. The reason is that all three centres must be equidistant from S (the star point) and the spurious star point (the in-phase point), indicating further that U must lie on QR, produced, not between Q and R, since a straight line cannot intersect all three sides of a triangle. The part of the line between Q and R is for negative values of the impedance ratio Z_c/Z_b. The shorter sides RP and PQ contain all positive values of the ratios, respectively Z_a/Z_c and Z_b/Z_a from zero to infinity, while negative values of these ratios appear on these sides produced.

The construction is identical if the supply voltage is unsymmetrical, except that the scale of division of the lines QL, RM and PN is different. The application of the construction to an unsymmetrical triangle ABC is shown in Fig. 2. The line voltages are AB=7 units; BC=8 units; CA=9 units. We must now make

QL = (AB/CA) (Z_c/Z_b) AQ, i.e. $(\frac{7}{9})(2)$AQ

RM = (BC/AB) (Z_a/Z_c) BR, i.e. $(\frac{8}{7})(\frac{3}{2})$ BR

PN = (CA/BC) (Z_b/Z_a) CP, i.e. $(\frac{9}{8})(\frac{1}{3})$ CP

The impedances and the line voltages

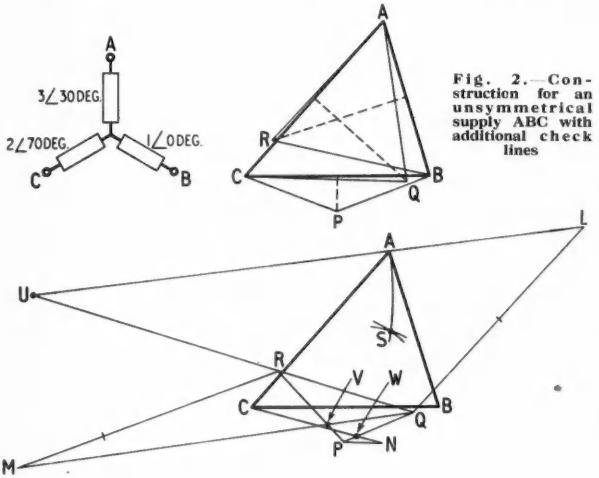


Fig. 2.—Construction for an unsymmetrical supply ABC with additional check lines

(Fig. 2) are the same as chosen in the illustrative example of the earlier method[2] with which the construction may be compared. All three centres U, V and W are found and, since these extra construction lines might otherwise complicate the diagram, the process is shown in two parts: first the determination of the points P, Q and R and then the completion of the diagram for U, V, W and S. The explanation of the construction of Fig. 1 is valid also for Fig. 2, except for the changed scale of QL, RM and PN.

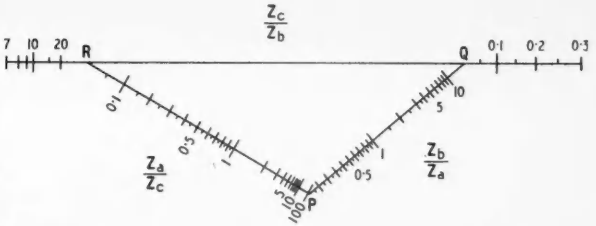


Fig. 3.—Triangle PQR (of Fig. 2) scaled for any values of the impedance ratios (and drawn three times larger)

If a number of circuits are to be considered, having a fixed phase angle in each phase but any ohmic value, then the sides of the triangle PQR may be fully scaled as in Fig. 3, to locate U, V and W for all possible values of the impedances. The triangle PQR then affords the full information about the impedances since the angles of the triangle are equal to the phase difference angles. In this case, example 2, $P\hat{R}Q = 30$ deg; $R\hat{Q}P = 40$ deg; $Q\hat{P}R = 180$ deg $- 70$ deg. All that then remains to be done, for each set of values, is to select the locus centres corresponding to two of the impedance ratios and to describe the locus arcs which intersect at the star point.

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[2] "A.C. Network Analysis II," Dr. L. Tasny-Tschiassny, *Electrical Review*, 26th December, 1947.
[3] "Impedance Network Analysis," W. M. Mackay, *Electrical Review*, 13th May, 1949.
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NEW BOOKS

Transmission Lines and A.C. Networks. By T. F. Wall, D.Sc., D.Eng., M.I.E.E. Pp. 328; figs and index. George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2. Price 30s.

This book is to be recommended to the student of transmission engineering chiefly because of the large amount of material lucidly presented which is not usually to be found dealt with at such length and from the same aspect in the existing standard works on the subject. The text is amply illustrated, but suffers badly from irrational marshalling of the subject matter, which in some sections is not complete enough, and which contains some terms which are not standard. It is not, therefore, a suitable introduction to the subject.

After making a survey of electric power requirements, and transmission, past, present and future, the author deals with the design of overhead lines in Chapter II, which is wholly devoted to mechanical considerations, no mention being made of the electrical principles involved.

Chapter III on symmetrical component analysis is very valuable, but ought to have been preceded by the basic theory of Chapter XI which, devoted to the symbolic method of a.c. network calculation, should have appeared much earlier in the book.

The device used on page 84 to distinguish between primary and secondary induced e.m.f.s should never be used since it destroys the fundamental principle upon which vector diagrams are based. (A phase displacement is shown between them for "clarity.") Equally undesirable is the representation in circuit diagrams of what appear to be current transformers in the section dealing with protective systems. This chapter is not complete enough to justify its inclusion and leaves the reader

with the impression that the impedance-time system is the sine quâ non of system protection.

The question of surges on overhead lines has become divided between two chapters, some of it being included in the chapter on heavy current cables, its assimilation being dependent upon a reading of the remaining quota which appears in a later chapter. Generally this work has the essentials of a highly desirable text-book. An early revision of the presentation should therefore be made.—G.H.

The Future of Nationalization. By H. A. Clegg and T. E. Chester (pp. 211). Basil Blackwell, 49, Broad Street, Oxford. Price 12s 6d.

This book is divided into four main chapters. The first briefly reviews the reasons offered for nationalization and outlines the previous history of the nationalized industries. Chapter II deals with the organization of these industries and the authors remark upon the short time allowed for the framing of the initial structures. In the case of electricity supply the Royal Assent was given to the 1947 Act in August of that year and vesting day was 1st April, 1948. It is a tribute to those concerned in the change-over that the organization which they set up has worked as well as it has done. Of course the B.E.A. was fortunate in inheriting a co-ordinated generating and main transmission system.

Problems of nationalization both foreseen and unanticipated are analysed in Chapter III, the questions of size of unit and the relationships between the units and the national authority being among the most important.

In the final chapter, containing proposals for the reorganization of nationalized industries, the authors have been overtaken by events in the transport and iron and steel industries. As regards electricity supply, it is regretted that the Electricity Commissioners and the Central Electricity Board have disappeared, and it is suggested that the Commission should be re-established to supervise the activities of the Area Boards, the powers of the B.E.A. being curtailed thereby. The power stations should be transferred to the Area Boards, although the B.E.A. would retain the same operating control over generation as was exercised by the C.E.B. Brief consideration is given to a number of problems which would still remain unsettled.

It seems to be implied that the district organizations should be given a freer hand, with the Area Boards merely providing technical and financial services and controlling development. The virtual disappearance of the Sub-Areas is envisaged, although in some cases an intermediate "service" arrangement might take their place.

Whether the ideas put forward can be usefully adopted or not, the book contributes some fresh thought on a most important subject.—J.H.C.

SOUTH AFRICAN NOTES

A £2,300,000 project is under way at East London: the erection of a power station for the Electricity Supply Commission. Designed to have an ultimate capacity of 90,000 kW, the station will not be in operation until 1955. Work is going on at present on blasting and drilling through solid rock to provide a bed for 7ft diameter cement pipes which will carry water at 14,000 gal/min to the boilers. These pipes are being laid at a depth of 31ft from the surface in some places. The new power station will not only increase the power supply of East London, but will also spread the system to inland towns like Kingwilliamstown, Alice, Fort Beaufort, Bedford and Adelaide.

Railway Electrification

On 8th April the first electric locomotive was run on the newly electrified section between Bellville and Worcester, a special train carrying the Minister of Transport and senior officials. Stops were made at all the main points, where speeches of welcome were made by the respective mayors. This does not mean the general use of electric trains, but it is expected that a beginning will soon be made with electric locomotives on this section, until eventually the bulk of the services will be run electrically.

Salt River No. 2 Power Station

The Cape Steel Construction Co. (Pty.), Ltd., is at present engaged in erecting the steel frame of the new Salt River No. 2 power station on the shores of Table Bay. Most of the connections are being made by electric welding. The turbine house has now been erected and good progress has been made with the steel sections and other work for the bunker house.

I.E.S. Dinner

Challenge of the New Era

THOUGH not quite so many as on the previous occasion two years ago, there was a company of about 200 members and guests at this year's dinner of the Illuminating Engineering Society on 13th May at the Café Royal, London, W.1.

Dr. W. J. Wellwood Ferguson, M.B., Ch.B., the president of the Society, occupied the chair and the chief guest was the Earl of Verulam who proposed the toast of the I.E.S. in what he described as a few disjointed remarks about science and art which indicated how different men and women would attempt to solve much the same problems in different ways. After mentioning some of his observations in South America and on Canvey Island during the recent floods (the speaker incidentally being a part-time member of the North Thames Gas Board), Lord Verulam drew attention to the causes of pneumoconiosis in the anthracite coal fields of South Wales and elsewhere. He mentioned the researches of Dr. Fletcher into that disease and he had found that it had nothing to do with silica, but was

(1) The president (Dr. W. J. Wellwood Ferguson), Sir Harold and Lady Himsworth and Mr. W. R. Stevens (president-elect). (2) Col. B. H. Leeson, Mr. W. J. Jones and Mr. H. Hewitt. (3) Mr. and Mrs. H. C. Weston, the Earl of Verulam, and Mr. and Mrs. D. C. B. Maclurcan. (4) Miss Jones and Mr. and Mrs. N. V. Everton

caused by the inhalation of coal dust which itself contained very little silica dust. Dr. Fletcher propounded the idea that one thing which mattered was the provision of adequate light underground, for when the miner could see dust he stopped working in it. There was scope for lighting engineers to do better work.

The president, responding, remarked that they were at the beginning of a new Elizabethan era and he hoped historians would find in it something of the older era. It was a challenge to science and art, which he believed were as alive in the I.E.S. as elsewhere. He hoped the challenge would be accepted by youth and considered it up to older members to offer encouragement in the new era as was customary in the former era. The I.E.S. was becoming too canalized on the technical side of illumination. It must progress or fade and so must extend its activities to attract members from outside the ordinary circle of designers and makers of fittings.

Mr. H. Hewitt proposed the health of the guests in a delightful way which exactly suited the occasion and expressed the Society's gratification at the presence of the President of the Institution of Electrical Engineers, Col. B. H. Leeson.

Col. Leeson, in replying, congratulated Mr. Hewitt on the manner in which he had proposed the toast and thanked the Society for a most enjoyable evening.

After the dinner there was dancing to the music of Leon Wayne's orchestra.

Election of Officers

At the annual general meeting of the Society held at the Royal Society of Arts on 12th May, Dr. W. J. Wellwood Ferguson, president, announced the names of officers and new members of Council to take office in October as follows:—

President: Mr. W. R. Stevens (General Electric Co., Ltd., Research Laboratories). Vice-presidents: Mr. H. G. Campbell (Benjamin Electric, Ltd.), Dr. W. E. Harper (Imperial Chemical Industries, Ltd.), Mr. A. H. Owen (Cryselco, Ltd.), Mr. J. F. Stanley (British Standards Institution), Mr. W. J. P. Watson (Holophane, Ltd.). Hon. treasurer: Mr. E. B. Sawyer. Hon. secretary: Mr. H. C. Weston. Hon. editor: Dr. W. E. Harper.

New members of Council: Messrs. N. Boydell (South Eastern Electricity Board), C. Dykes Brown (General Electric Co., Ltd.), T. Catten (Falk, Stadelmann & Co., Ltd.), H. Hewitt (North Western Electricity Board), H. G. Jenkins (General Electric Co., Ltd., Research Laboratories), W. Robinson (E.D.A.), Dr. W. S. Stiles (National Physical Laboratory), and Mr. D. A. Strachan (National Coal Board).

"Nalgo" Dinner

SIR WALTER MONCKTON, Minister of Labour and National Service, was the principal guest at the annual dinner of the National Executive Council of the National and Local Government Officers' Association ("Nalgo") at the House of Commons on 15th May. The president of the Association, Mr. W. Strother, A.M.I.C.E., was in the chair and proposed the toast of "Whiteleyism." He said that the Whitley Council system and the Ministry of Labour started together in 1916 and since then Nalgo had worked with the Ministry in settling disputes in the local government service by peaceful means. Nalgo was a party to the setting up in 1944 of the first National Joint Council which formed the pattern for those in the nationalized industries.

Replying to the toast Sir Walter Monckton said that Whiteleyism was based not merely on logic but on a spirit of give and take. Variety and flexibility were outstanding characteristics of the system. His Ministry greatly appreciated all that Nalgo had done for Whiteleyism.

Mr. T. Nolan, A.C.I.S. (Yorkshire Electricity Board), senior vice-president of the Association, proposed "The Public Services" which he enumerated as electricity, gas, health and transport. He spoke of the value of local government experience in the administration of the nationalized industries. A response was made by Mr. F. H. Jones, M.B.E., M.Inst.GasE., A.M.I.C.E., deputy chairman of the Gas Council, who said that the public services were the accepted background of ordinary life and it was only when something went wrong that they received much attention from the public. Dealing with organization Mr. Jones said that nothing was more expensive than cheap administration.

The toast of the Association was proposed by Dr. W. A. Robson, Professor of Public Administration, University of London, who considered that great credit was due to Nalgo for creating a unified local government service, the principles of which had been extended to other public services. Mr. A. E. Odell, vice-chairman of the National Executive Council, acknowledged the toast.

Mr. L. H. Taylor, junior vice-president of Nalgo, toasted the health of the guests, on whose behalf Sir Howard Roberts, C.B.E., Clerk of the London County Council, replied.

Development in 1952

E.D.A.'s Thirty-third Annual Report

QUALIFIED optimism is evinced in the report of the Council of the British Electrical Development Association for 1952 (the thirty-third). It is noted that the year "opened in an atmosphere of austerity and closed with brighter promise for the future." The Association was discouraged from national Press advertising but maintained its links with the various sections of the public by participating in the principal national shows and exhibitions and by means of films and publications.

The Council announces its intention of pursuing vigorously the electrification of industry; at the same time it is convinced that much attention must now be given to the development of those loads which will improve the public supply system load factor.

Expressing its profound belief in the social and economic benefits which result from a comprehensive electricity service and in the future of the industry, the Council is happy to record that most of the Association's activities, temporarily suspended at the beginning of 1952, were in process of being restored at the close of the year.

Combating Anti-Electric Propaganda

The report then proceeds to review the many activities of the past year. It is mentioned that the following new contributors were enrolled:—The Trinidad and Tobago Electricity Commission, the Alderney electricity undertaking, the Federation of Electricity Undertakings of India and the Saudi Electric Supply Co.

Electrical matters figured prominently in the Press throughout the year and the Association took steps to present the case for electricity when anti-electrical articles appeared. Special mention is made of two articles in the *Financial Times* by the president, Dr. P. Dunsheath. A great deal of assistance was afforded to the Press in the way of articles and photographs and a good deal of editorial attention was secured. Reference is made to radio and television, the British Electrical Power Convention and purchase tax activities.

Lists are given of 26 new publications—general, agricultural, industrial, technical, etc.—issued during the year and of 13 others in course of preparation.

New Films

Four further films were produced in the educational series and another on materials handling was completed and widely distributed. During the year 13,819 copies of films were issued on loan and a further 388 prints were purchased by members and educational authorities, and 58 were purchased by the Air Ministry for use in R.A.F. training schools. Arrangements were completed for the distribution of E.D.A. films through agencies in many parts of the world, some with foreign language commentaries. Films were also shown at international film festivals and the film "Magnetism" won a diploma and trophy at the Berlin festival and a diploma at Delhi.

E.D.A. had displays in eight national exhibitions and designed exhibits for several others. The electrical sections of the London and Glasgow Building Centres were also dealt with.

Much attention was given to rural electrification. The Association took part in a number of agricultural and allied shows and engaged in a number of educational movements.

In the matter of industrial electrification a "Steering Committee" was appointed to direct such activities as the production of study books, the production of films, film strips, booklets, etc., and increased advertising in technical and trade journals. Eight books on various aspects of the use of electricity in industry were planned and four of them were published by the end of the year. A number of papers and lectures were given before institutions and societies interested in industrial production. An important event was the Industrial Productivity Conference held last October.

In the section dealing with commercial

development there are references to assistance given to Government Departments; space heating (including special attention to floor heating); the Television Inventors' Club; electricity in housing; kitchen planning; the reconstitution of the Domestic Installations and Appliances Committee, with its Cooking and Water Heating Sub-Committees; the Commercial Catering Conference; the Refrigeration Sub-Committee; the Sub-Committee on Radio Interference Suppression (which secured the acceptance of reduced values of capacitance); street lighting (including trial installations); the E.D.A.-B.S.I. Advisory Committee on Electrical Appliances and Accessories; and the activities of the Trolley-bus and Tramways Committee.

It is hoped that with the engagement of additional staff the new Testing House laboratories at Leatherhead will be in full operation by the end of this year. Reports were prepared for the Canadian Standards Association Approvals Agency, the Advisory Committee on Electrical Appliances and Accessories, Area Boards, etc. A new departure was the preparation of reports for manufacturers desiring certification of compliance with British Standards; in the two cases submitted neither appliance reached the required standard.

Educational activities included the public speaking competition; the salesmanship course; lectures and papers for organizations within and outside the industry, film displays, etc.; assistance to schools and institutions; and equipment for domestic science teachers' training colleges.

The report is signed by the president (Dr. P. Dunsheath), the chairman (Mr. H. Nimmo) and the general manager and secretary (Mr. V. W. Dale). Appended are notes on the work of the Electric Vehicle Association of Great Britain and the Electrical Association for Women.

Sales and Service

Practical Problems Discussed at E.D.A. Conference

THE final session of the E.D.A. Electricity Sales and Service Conference last Friday was devoted to a general discussion of a number of problems concerning electricity sales development, with suggested improvements for future conferences. Mr. V. W. Dale, general manager and secretary of E.D.A., presided.

Mr. W. Gilchrist (chief commercial officer, Merseyside and North Wales Electricity Board) put forward a twelve-point plan for improving the conference, while Mr. W. R. Rowe (Cornwall Sub-Area, S.W.E.B.) had something to say on the title, status and representation of the conference. Mr. Rowe suggested that "Electricity Conference" or "Commercial Management Conference" would be a more apt title and that "commercial manager" was a better title than "commercial engineer." Autumn or early winter, he thought, was a better time to hold the conference than a month before the British Electrical Power Convention. Mr. L. G. Price (Edinburgh Sub-Area, S.E. Scotland E.B.) suggested the possibility of holding discussion groups.

Mr. J. J. Lesser (North Western Sub-Area, L.E.B.) said that while shortage of generating plant had been largely overcome restrictions on capital expenditure continued. Insufficient capital was available for distribution and it seemed to have been forgotten that the electrical industry had been built up on assisting the consumer financially. The standardization of tariffs might well result in anomalies detrimental to the industry. Emphasis on planning and standardization was taking the enterprise out of the industry. There must be some margin for competition and there might be a little less rigidity in bulk supply tariffs to the Boards.

Miss K. Wilson (B.E.A.) suggested "The E.D.A. Conference" as a more suitable name and Mr. W. G. Chilvers (N.W.E.B.) thought that it should have a definite theme, while Mr. E. C. Claydon (S.E.E.B.) wanted specialist meetings. Mr. W. E. Swale (N.W.E.B.) suggested a short paper competition, the best ones being submitted to the conference.

Mr. J. B. Ashworth (N.W.E.B.) declared that he was convinced that one of the

Delegates at one of the sessions of the Electricity Sales and Service Conference

greatest troubles confronting electrical development was the inclusion of too many charges for administration: the commercial side should have a larger say in administration. Improved training facilities for sales staff were asked for by Mr. K. R. H. Glass (Y.E.B.), while Mr. Bond (S.E.E.B.) wanted a training centre for demonstrators and the provision of more agricultural advisers. Mr. Dale hoped that the industry was going to change its mind about sales training and said that E.D.A. already had a scheme, but commercial staffs were so overworked that it had not been possible to introduce it.

Mr. R. H. Rawll (N.W. Sub-Area, L.E.B.) said that what was lacking was the opportunity to sell and it was necessary to introduce an aggressive policy. Mr. C. R. Waters (Suffolk Sub-Area, E.E.B.) said that the reason they had not got salesmen was the relatively poor pay and conditions of service. Mr. A. O. Johnson (chief commercial officer, N.W.E.B.) contended that the question of selling had got to start at the top. It was a reflection on the chief commercial officer if the establishment officer controlled sales policy. Mr. A. D. Hegan (Merseyside and N. Wales E.B.) appealed to the B.E.A. to guarantee a 50 c/s supply even at the cost of a little load shedding and so make true once again the slogan "Electric Time is the Right Time." Mr. E. S. Dunch (Bermuda) preferred the term customer to consumer.

Mr. J. I. Bernard (chief technical officer, E.D.A.) gave details of a list of approved appliances which is about to be circulated to Area Boards and housing authorities and spoke of the productivity campaign. Referring to a few of E.D.A.'s recent activities, Mr. Dale said that after a period of thirteen years there was evidence that they were returning to conditions when E.D.A.'s true function of electrical development could again be resumed. There was to be a considerable increase in Press and other publicity with the theme "Electricity—a Power for Good." New films were being made dealing with smoke abatement, kitchen planning and cookers.

At a luncheon which followed the final session, Mr. H. Nimmo, chairman of the Association, presided for the first time since his illness. He said that the conference played a very important part in the electrical organization. Competition with gas and solid fuel was more keen now than ever before and it was up to everyone to improve load factor and electricity service generally. They were on the threshold of a new drive to sell electricity and they should feel great pride that with initiative and enterprise they would be able to bring better life and more happiness to the homes of this country. Mr. W. R. T. Skinner (deputy chairman, S.E.E.B.), expressed thanks to Mr. Dale and the E.D.A. staff for showing how to get on with the job of selling electricity.

VIEWS on the NEWS

By REFLECTOR

WE have all heard of the hordes of men sent by Electricity Boards to install water heaters or other appliances. The Gas Boards are accused of similar practices. At the annual conference of the National Chamber of Trade a delegate told what happened when a housewife found a leak in the flexible tube of her gas poker. She telephoned the Gas Board which sent a man who "played around" with the tube for two hours without remedying the fault. A further telephone call brought the reply that according to the books the house was vacant. The next day a supervisor called and presented the woman with a form which she had to sign. On the following day a 5-ton lorry delivered a new length of tubing but the driver said it was not his job to fit it. She again telephoned and was told that her house was vacant and the following day a lorry called and took the new tubing away again. It's an amusing story even if it does sound too good to be true.

* * *

According to the *Evening Chronicle* (Manchester) the Middleton Town Council has changed its representative on the North Western Electricity Consultative Council from a Socialist to a Conservative. The new member, although ruled out of order, is reported to have said: "I won't press for cheaper electricity—I'll press for the abolition of the Board." He evidently does not share the view that the two things go together—or does he?

* * *

A housewife writes to the *Bristol Evening Post* suggesting special summer prices for gas and electricity as there are for coal. It certainly seems a pity that this practice, which was fairly common at one time, has now entirely ceased so far as I can see. The B.E.A. report for 1952 shows that in June, July and August the monthly-output curve remained below the 4,000 million kWh line while it was above 5,000 million from October to March. A lower summer rate would help to level up, but of course there are arguments against it. First, the continuous meter-reading system prevents a clearly defined line between summer and winter quarters, although this did not deter some of the former undertakings. Then a great deal of plant is out of service for overhaul during the summer and it might prove difficult to meet a much heavier demand. I doubt, however, whether the demand would be increased sufficiently to cause trouble.

* * *

I occasionally hear of substation attendants cooking meals on overloaded transformers. Conditions in some areas are bad, I know, but the stories, like the meals, need a little salt. And so does a statement by the Mayor of Harrogate reported in the *Observer*. In that Yorkshire resort they organized a "French Week" and, says the report:—

> "The municipality of Harrogate took a courageous initiative by starting French classes in the primary schools. Like all innovations this created a good deal of opposition. The Mayor told me with a smile that the telephone lines were literally red-hot for a fortnight."

I suppose the Mayor's "literally" must be taken in conjunction with his smile.

* * *

Electricians certainly cover a wide range in their collective deliberations. Much time was spent at the E.T.U. conference last week in discussing the high cost of living in relation to wages. Not satisfied with this, however, the delegates also debated funeral costs. Undertakers' charges were said to be prohibitive and there was a call for the nationalization of that "industry."

Oil-Filled Cable Installation

A Recently Completed Junction

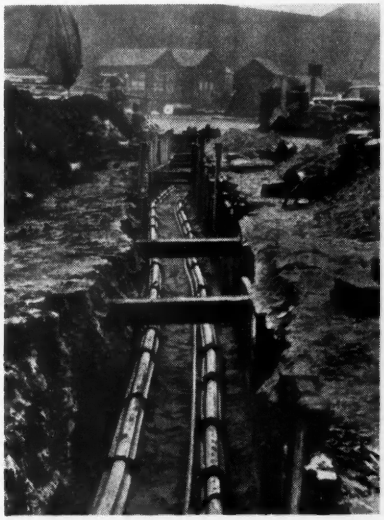
THE double-circuit 132 kV overhead line which interconnects the Brimsdown generating station and the B.E.A.'s new London Division generating station at Brunswick Wharf, Poplar, is connected to the switchgear in the new generating station by Henley 132 kV oil-filled cables laid underground.

The Poplar terminal tower of the overhead line is adjacent to the Brunswick Wharf generating station. The length of the 132 kV cable route for No. 1 circuit is 800 yd and that for No. 2 feeder is 750 yd. For each feeder the cable consists of two trefoil groups of 0·35 sq in 132 kV single-core lead-sheathed 12 mm duct oil-filled cable finished with anti-corrosive rubber protection. A 7/·029 10-core p.l.s.w.a. and served auxiliary cable is laid with the power cables.

The latter terminate at each end in vertical sealing ends mounted on lattice galvanized steel structures which are accommodated in the switch-house of the generating station at the one end and in a specially constructed enclosure around the terminal tower base at the other end. The work of installing the cables included the construction of two joint bays to accommodate twenty-four straight-through joints in the twelve single-core cables.

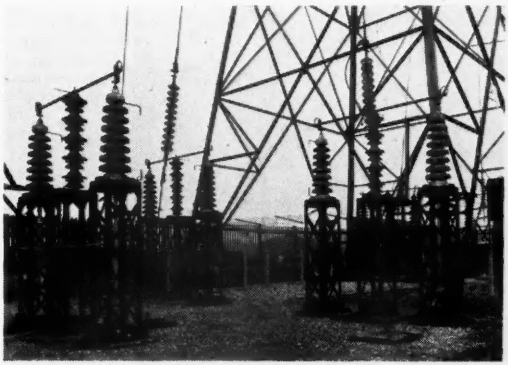
Oil pressure in each of the six cables of No. 1 feeder is maintained by a 135 litre 1·5 atmosphere pre-pressured tank while the oil pressure in the cables of No. 2 feeder is maintained by three 225 litre tanks, one for the two cables of each phase. The nine pressure tanks for the whole cable installation are situated in the enclosure around the terminal tower of the 132 kV line.

At one part of the route the cables are laid in a subway passing under a lock



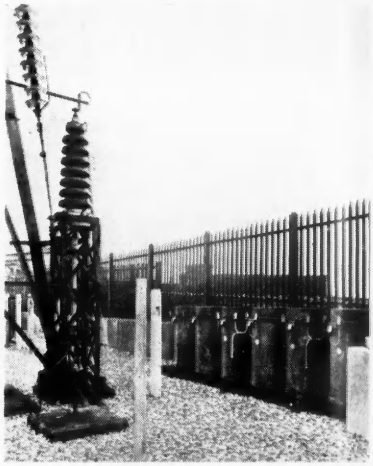
Henley 132 kV oil-filled cables in trenches at Brunswick Wharf

Connections at the terminal tower of the Poplar–Brimsdown overhead line at Brunswick Wharf



adjacent to the East India Dock. As seepage is likely to occur in the subway, thus exposing the cables to the action of water from the River Thames, particular attention had to be given to the cables and the materials used for this part of the installation. The anti-corrosive rubber protection applied to the 132 kV cables for the entire route was considered an adequate safeguard against corrosive influences and for the subway section similar protection was applied to the 10-core cable. Hardwood cleats were employed for supporting the cables in the subway and, to avoid deterioration and liability of damage to the cables by swelling, the cleats were made from Iroko timber. In the two 4ft wells giving access to the subway, shaft type cleats are used for supporting the cables. The steelwork which supports the cleats has been sprayed with zinc by the Schori process, afterwards being treated with a primary coat of zinc chromate paint at the maker's works. After erection, two further coats of this primer were applied and finally two coats of chlorinated rubber paint.

Henley Contract Department engineers were responsible for the whole of the cable installation work described above and we are indebted to the London Division of the British Electricity Authority for permission to publish the details.

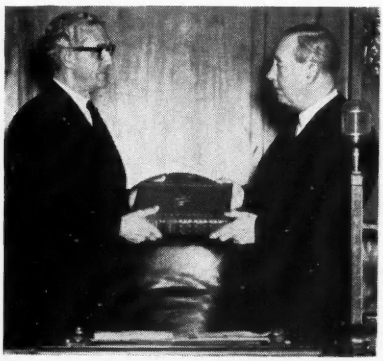


Pressure tanks feeding the 132 kV oil-filled cables at Brunswick Wharf

A Siemens Collection

THE originals of more than 250 letters, written by celebrated men of science, statesmen, artists and noblemen, to Sir William Siemens, the distinguished scientist and engineer of the last century, have been acquired by Sir George H. Nelson, chairman and managing director of the English Electric Co., Ltd., from Mrs. Mildred Wells, a first cousin of Lady Siemens, and they have now been bound in two handsome volumes. To the collection has been added a short biography of Sir William Siemens written by Mr. W. H. Kennet, the well-known scientific writer. A third and equally handsome volume has been added containing the biography, the printed copies of all the letters and facsimile reproductions of 22 of them for presentation by Sir George Nelson to the Institution of Electrical Engineers.

In addition to the three leather bound volumes a thousand copies of a general edition of the letters have been printed. These are to be presented to universities, libraries and engineering societies. All the basic research for the biography by Mr. Kennet was undertaken by Mr. W. G. Friggens, of the chief engineer's department of the English Electric Co., Ltd.



Sir George Nelson presenting the volume of Sir William Siemens' letters to Col. B. H. Leeson, President of the I.E.E.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Council of the Institute of Transport has elected **Mr. John Elliot,** M.Inst.T., president of the Institute for 1953-54, and he will assume office on 1st October next upon the retirement of **Mr. C. T. Brunner.** Mr. Elliot is chairman of the Railway Executive.

Mr. A. N. Bott, M.I.E.E., F.R.S.A., manager of the Lyndhurst District, Southern Electricity Board, is taking up the position of general manager, and a member of the Central Electricity Board, Mauritius, as from 1st August next, and leaves this country on 5th July. Mr. Bott was educated at Mundella Grammar School and the University College, Nottingham. In 1930 he was appointed assistant engineer and surveyor with W. T. Henley's Telegraph Works Co., Ltd., and in the following year joined the J. L. Eve Construction Co. as resident engineer. In 1932 he joined Johnson & Phillips as assistant to the resident engineer, S.W. England, and in 1933 became assistant engineer with the Westmorland Electric Supply Co., in the same year joining Buchan & Partners as resident engineer. Two years later he became associated with the Kirkcudbright County Electricity Department, becoming county electrical engineer in 1940. From 1947 to vesting date he was city electrical engineer at Winchester. Mr. Bott asks us to state that after 30th June next, correspondence to him should be addressed to the Central Electricity Board, Port Louis, Mauritius.

Mr. A. N. Bott

Mr. Walter Newman, chief designer of Salford Electrical Instruments, Ltd., has retired after forty-five years' service with the company.

Mr J. Chapman, Graduate I.E.E., formerly control engineer, Tir John power station, South Wales Division, British Electricity Authority, has been appointed an assistant engineer, District 226 (Llanelly), in succession to **Mr. D. H. Hughes,** A.M.I.E.E., who has been appointed an assistant construction engineer in the South Wales Electricity Board's West Central Sub-Area, whose headquarters are Fforestfach, Swansea.

Mr. Porter Hart, chief instrument engineer of the Dow Chemical Co.'s Freeport, Texas, plant, and president of the Instrument Society of America, and **Mr. Richard Rimbach,** publisher of *Instruments* and *Instrument and Apparatus News* and managing director of the First International Instrument Congress and Exposition, are leaving for Europe on 26th June to return to the United States on 24th July. They will visit London, Birmingham, Hanover, Düsseldorf, Frankfurt, Stuttgart, Munich, Milan, Zurich, Geneva and Paris. Meetings have been arranged with instrument engineers and representatives of technical and scientific groups, to invite their attendance at the Congress and Exposition which will be held in Philadelphia, Pennsylvania, U.S.A., from 13th to 25th September, 1954.

Mr. W. R. Stevens, B.Sc., M.I.E.E., F.I.E.S., of the Research Laboratories of the General Electric Co., Ltd., who, as we report on another page, has been elected president of the Illuminating Engineering Society for 1953-54, is already chairman of the I.E.S. Summer Meeting Committee, and a former hon. editor of the Society's transactions. Mr. Stevens joined the Research Laboratories of the General Electric Co., Ltd., in 1932, after working for three years under Dr. J. W. T. Walsh at the National Physical Laboratory in the Photometry Division. He has served on many Government and B.S.I. Committees and has contributed various papers to societies on a wide range of lighting subjects, including industrial lighting, film studio lighting, and the design of lighting equipment. He was awarded the Crompton Premium of the Institution of Electrical Engineers for 1946-47 in conjunction with a colleague, Mr. V. J. Francis, B.Sc., F.Inst.P., M.I.E.E., for a paper on "The High

Mr. W. R. Stevens

Pressure Mercury Vapour Discharge and its Applications." An examiner in illuminating engineering for the City and Guilds of London Institute, Mr. Stevens has taken an active interest in furthering education in lighting. He has given many I.E.S. "children's lectures" and is the author of a book entitled "Principles of Lighting." During the war Mr. Stevens was employed on camouflage and visibility work.

Mr. John Reid, Dipl.Arch., A.R.I.B.A., has been appointed design consultant for the Atlas lighting division of Thorn Electrical Industries, Ltd. Mr. Reid has already been associated with the company's subsidiary, George Forrest & Son, Ltd., for whom he designed a range of "Forrest Modern" lighting fittings. His new activities will extend to industrial and commercial fluorescent lighting equipment.

We reproduce a portrait of **Mr. T. R. Smith,** A.M.I.E.E., who, as reported last week, has been appointed assistant commercial officer to the Merseyside and North Wales Electricity Board. Mr. Smith was educated at the Old Trafford Technical Institute and the Manchester College of Technology and received his practical training with the Metropolitan-Vickers Electrical Co. He joined the former North Wales Power Co. in 1930 as senior testing assistant and was subsequently development assistant (1935-38) and power sales engineer (1938-48). Upon nationalization Mr. Smith was appointed commercial officer to the No. 4/5 Sub-Area of the Merseyside Board. He is a council member and past-president of the North Wales Society of Engineers and has presented several papers before engineering and other bodies.

Mr. T. R. Smith

Mr. W. Gilchrist, A.M.I.E.E., M.I.H.V.E., has succeeded **Mr. A. V. Milton** as chairman of the Liverpool Centre (North Western Area) of the Illuminating Engineering Society. Mr. Gilchrist is chief commercial officer for Merseyside and North Wales Electricity Board.

Mr. E. L. Edwards, late of Edstone, Ltd., has been appointed managing director of Modern Acoustics, Ltd.

At the Council meeting of the Cable Makers' Association on 6th May, Mr. F. Waine, chairman, presented to **Sir John Dalton** a handsome sporting gun and a dressing case on behalf of the C.M.A. members. Mr. Waine referred to the valuable services rendered by Sir John during his five years as director of the C.M.A., and of the great regard in which he was held by all departments.

Mr. F. Waine (chairman, C.M.A.), making a presentation to Sir John Dalton

Mr. H. W. Baylis has taken up the appointment with the Trinidad and Tobago Electricity Commission as protection and test engineer and will be leaving in July for Trinidad. He takes up his appointment on 8th June, but will be carrying out certain work for the Commission in England before leaving for Trinidad. Mr. Baylis was formerly in the Central Gloucestershire Area of the Midlands Electricity Board.

Mr. C. J. Teasdel has resigned his appointment with Crompton Parkinson, Ltd., to join the board of M.T.E. Control Gear, Ltd., as sales director. Following a student apprenticeship with Crompton & Co., Ltd., he has held various positions in the plant sales division of Crompton Parkinson, Ltd., and until recently was manager of the Home Counties Sales Branch. During the war, Mr. Teasdel served in the Far East campaign with the Indian Sappers and Miners, attaining the rank of major.

Mr. C. J. Teasdel

Mr. Michael Clear, M.I.Mech.E., who joined the Brush Aboe group in 1945 and has been for the past three years managing director of Brush Aboe (Southern Africa), Ltd., has

now been appointed group sales director of the Brush group of companies, and a member of the board of Associated British Oil Engines, Ltd. This is an advisory appointment and Mr. Clear will take up his new duties in London in the early autumn.

Mr. Clear received his practical training with W. H. Allen, Sons & Co., Ltd., Bedford, where he served a three years' pupilship until 1938. He then joined the general chemicals group of Imperial Chemical Industries, Ltd., as an engineer. A member of the Territorial Army he was called up on the outbreak of war into the Royal Tank Regiment. He joined R.E.M.E. when it was formed in late 1942, and was promoted to lt.-colonel in 1943. He was released from the Army in this rank in 1945, when he joined the Brush group to take charge of all the company's operations in the Middle East. In June, 1950, Mr. Clear was appointed managing director of the group's overseas sales company in Johannesburg, and he is returning on 5th June.

Mr. F. A. Vaughan succeeds Mr. Clear as managing director of Brush Aboe (South Africa), Ltd. He has been associated with one or other of the companies of the Brush group for the past thirty-five years and is overseas director of Associated British Oil Engines (Export), Ltd., and National Oil Engines (Export), Ltd. Mr. Vaughan received his engineering training with Petters, Ltd., Yeovil, with whom, in 1930, he became export manager. On the formation of British Oil Engines (Export), Ltd., in 1944, he was appointed one of the original directors of the company.

Mr. K. Higginson has retired from the position of publicity manager to the Dubilier Condenser Co. (1925), Ltd., which he has held for the past nineteen years. Mr. Higginson is to act on a "free-lance" basis. His address is 322, Richmond Road, Kingston-on-Thames (telephone: Kingston 8072).

Dr. W. Idris Jones, director-general of research to the National Coal Board, has been elected to succeed Dr. G. E. Foxwell as president of the Institute of Fuel in October.

Following the annual general meeting of **A. Reyrolle & Co., Ltd.,** Sir Claude Gibb presented gold wristlet watches to twenty-five employees who had completed forty years' service with the company. Three others, Mr. H. P. McConway, Purchasing Department manager, Mr. J. J. Swales, a fitter, and Mr. J. V. Taylor, superintendent erector, who had completed fifty years, were each presented with an illuminated address and a cheque in recognition of their services.

The Metropolitan-Vickers Electrical Export Co., Ltd., has appointed **Mr. F. C. Hallawell** manager for Brazil in succession to Mr. H. W. Foy, who continues in an advisory capacity. **Mr. E. E. Sarasa** becomes manager for Argentina, while **Mr. R. Morris** is appointed technical representative in Colombia, Peru and Venezuela; for the present he will be located with the Metrovick agent in Bogotá, Colombia.

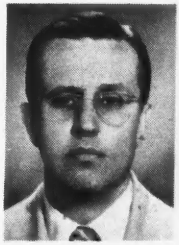
Mr. F. C. Hallawell joined the Metrovick Rio de Janeiro staff in 1937, having previously been employed in the Shell Oil Company's organization in Brazil. In 1941 he was seconded to the B.B.C. (Latin American Service) in the U.K., and, later, as a B.B.C. war correspondent, he accompanied the Brazilian Expeditionary Force in Italy. He returned to Metrovick in 1946, when he became commercial assistant to the manager for Brazil: when the manager's office was transferred to Sao Paulo, he remained in Rio, and later became Rio office manager.

Mr. E. E. Sarasa, I.C.A.I.(Madrid), I.G.(Liege), A.M.I.E.E., joined Metrovick as a college apprentice in 1938, and was subsequently a junior engineer in the Motor Engineering Department and then a sales engineer in the Industrial Control Sales Department at Trafford Park. In 1946 he was transferred to the Buenos Aires office as sales engineer for the Metrovick Export Company.

Mr. R. Morris, D.F.H., A.M.I.E.E., was educated at University College School and Faraday House. He went to Metrovick as a college apprentice in 1936 and two years later joined the Contracts Department. In 1941 he volunteered for the Royal Navy and attained the rank of lieutenant commander (sp.), R.N.V.R. In 1946 Mr. Morris joined the Metrovick Export Company as assistant to the principal representative at Trafford Park Works. Subsequently, he spent some time in the Switchgear Engineering Department and was then transferred to the American Division in London, where he was in close touch with the company's affairs in Latin America.

Mr. F. C. Hallawell

Mr. E. E. Sarasa



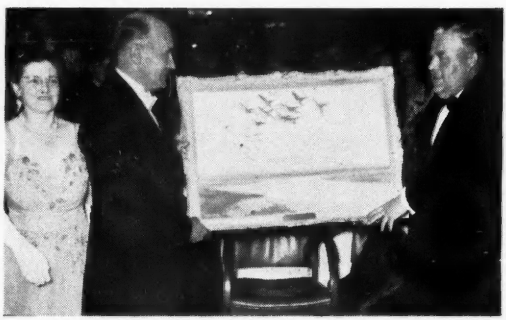
Mr. R. Morris

Mr. W. G. Hammond has completed fifty years' service with W. T. Henley's Telegraph Works Co., Ltd. He commenced at the company's North Woolwich factory in 1903, and since 1925 he has been foreman of the Silk and Cotton Covering Department; he went to Gravesend when his Department was transferred from North Woolwich in 1940. On 14th May Sir John Dalton (chairman), Sir Montague Hughman (director), Mr. S. J. Wilson (general works manager) and several other senior officials of the company attended a presentation ceremony in the company's engineering works conference room at Gravesend, when Sir Montague presented Mr. Hammond with a framed copy of a resolution of the board expressing appreciation of his service, and in addition a gift of National Savings Certificates. Sir Montague mentioned that Mr. Hammond was the twenty-eighth member of the Henley organization to receive such recognition on the completion of fifty years' service.

The Amateur Dramatic Society of **Siemens Brothers & Co., Ltd.**, Woolwich, presented "Who Lies There?" by Philip Johnson, at their Sports Club Pavilion, Charlton, on 2nd and 9th May. This was the Society's seventeenth production, and was greatly appreciated by the audiences, which included General Sir William D. Morgan, G.C.B., D.S.O., M.C., the company's chairman, Messrs. H. E. Humphries, M.B.E., managing director, S. W. Lumb, company secretary, W. E. Goodwin, telecommunication department manager, P. H. Winstanley and J. F. Mills, president and vice-president of the company's Canadian branch, W. T. Pope, labour manager and F. W. H. Shaw, chief cable engineer.

Adamson & Co. (Tyne), Ltd., the North East Coast wholesalers, celebrated their diamond jubilee (1893-1953) with a dinner for their staff and a party for the staff and friends on 8th May at the County Hotel, Newcastle-on-Tyne. Mr. C. J. Scott, general manager, supplies division, Crompton Parkinson, Ltd., for whom Adamson & Co. (Tyne), Ltd. are sole distributors in the four northern counties, proposed the toast of the company, and Mr. J. W. E. Rutherford, managing director, replied. During the evening an original oil painting was presented to Mr. Rutherford by the staff to mark the occasion. A birthday cake was cut with due regard to ritual by Mr. and Mrs. Rutherford, and the evening was completed with a cabaret.

Presentation to Mr. J. W. E. Rutherford (managing director, Adamson & Co. (Tyne), Ltd.), showing (left to right) Mrs. Rutherford, Mr. Rutherford and Mr. H. Younger



Organized by the Mersey and North Wales (Liverpool) centre of the **Institution of Electrical Engineers**, a golf competition was held at the Southport and Ainsdale golf course on 12th May. The profits from the event, which are expected to total about £150 including donations, will go to the Electrical Industries Benevolent Association. The Dennis trophy for the member returning the best score went to Mr. F. J. Brown, the runner-up being Mr. T. B. D. Terroni. Winners of the four ball competition were Mr. S. Mercer and Mr. W. Jackson. In the putting competition Mr. R. C. Eastwood was the winner.

Mr. C. S. Tabb, A.M.I.E.E., has been appointed deputy superintendent at Plymouth "B" generating station with effect from 27th April. Mr. Tabb was previously deputy superintendent at Plymouth "A" generating station.

OBITUARY

Mr. E. R. Desoutter.—The death occurred on 11th May of Mr. E. Robert Desoutter, managing director of Desoutter Brothers, Ltd. With his two brothers, Louis (who died before the war) and Charles, Mr. Robert Desoutter was a member of the firm right from the start, when its sole product was light metal artificial legs. In the middle and late thirties the manufacture of portable tools, made originally only for use in the production of limbs, began to overshadow the original business, and he added to his other responsibilities the development of the export business of the firm. He took over the managing directorship in 1947 on the death of his brother Charles.

Mr. G. P. Tutcher.—In a letter to the *Western Mail* Mr. C. T. Allan (formerly engineer to the South Wales Power Co.) mentions the recent death of Mr. George P. Tutcher, who was the first secretary of the South Wales Power Co., and served with its first three general managers: Messrs. Edmund L. Hill, W. A.

Chamion and J. W. Beauchamp. Mr. Tutcher retired in 1931 at the age of sixty-seven; he was thus eighty-nine years of age.

Mr. Robert Owen, for many years borough electrical engineer of Wigan, died on 13th May in his seventy-fifth year.

Mr. R. R. Venning, manager of the Lighting Fittings Department of the Light Group of Philips Electrical, Ltd., died on 6th May at the age of thirty-six. After six years' war service, for which he was awarded the M.B.E., Mr. Venning, a former student of Faraday House, joined Philips Electrical, Ltd., in 1946 as manager of the fittings section of the Lighting Department, and on the formation of the Light Group in 1950 he became manager of the Lighting Fittings Department. He was a member of several committees of the Electric Light Fittings Association.

WILLS

Mr. E. A. Gimingham, M.I.E.E., formerly a director of the Edison Swan Electric Co., Ltd., who died on 17th January last, left £36,021 gross (£35,893 net).

Mr. E. L. Joseph, M.I.E.E., F.C.S., founder and chairman of Ozonair, Ltd., who died on 24th February last, left £52,201 gross (£41,580 net).

Mr. F. Gurney, M.I.E.E., home sales manager, Metropolitan-Vickers Electrical Co., Ltd., who died on 27th November last, left £10,423 gross (£10,279 net).

E.D.A. AND THE FUTURE

Association's Annual Meeting

AT the annual meeting of the British Electrical Development Association on Tuesday last Sir Henry Self (deputy chairman (administration), B.E.A.) was elected to succeed Dr. P. Dunsheath as president. Dame Caroline Haslett was elected chairman of the Council in succession to Mr. H. Nimmo. The Council's report for 1952, which was presented at the meeting, is dealt with on page 1161.

An informal luncheon at which Mr. Nimmo presided followed the meeting when, proposing the toast of "E.D.A. and the Future," Dr. Dunsheath commended the efficient public relations service of the Association. He said that anti-electric propaganda had been effectively countered and the attacks had decreased. One result had been that the lay Press was taking a greater interest in electricity. Dr. Dunsheath referred to some of the principal activities of the Association, expressing particular appreciation of the "visual aids" which it had produced. He said that the shackles which had bound the Association were now being loosened and it could really start to sell its wares.

Mr. T. F. Lister, who explained that he was deputizing for Mr. D. D. Walker, chairman of the B.E.A.M.A. Council, said that after a long period of frustration it would take time for the industry to adjust itself to new conditions. Plant capacity had increased, purchase tax on appliances had been reduced and progress was being made with housing; these were all pointers to better sales of electricity and electrical apparatus. Manufacturers would be able to meet the increased demands and would support the supply industry in its endeavours to find new opportunities for the use of electricity.

Sir Henry Self

Dame Caroline Haslett

Sir Henry Self, who also responded to the toast, referred to the decision in 1948 to continue the Association and said that there had been a tendency to overlook E.D.A.'s valuable contribution in bringing people together to work out policies and co-ordinate activities. He hoped that the discussions now in progress would result in reasonable opportunities for development. Improved load factor was most important to enable full use to be made of the capital which had been expended on plant. As more plant came in service there was a tendency for the load factor to fall. That was why the industry must go ahead to secure diversity of domestic equipment and its use. They would have to hasten slowly, taking care not to offend public susceptibilities or to decry the efforts of rivals.

PARLIAMENTARY NEWS

By Our Special Reporter

LAST week in the House of Commons Mr. R. Winterbottom asked the Assistant Postmaster General if, before licensing sponsored television, he had sought an estimate of the cost of an adaptor to enable existing television receivers to obtain more than one programme; and what the estimate was.

Mr. Gammans said that no definite figure could yet be provided by the radio industry, but he understood the cost would not be large compared with the price of the set itself.

Mr. Winterbottom said he understood that the cost of the adaptor would be about £17. Would the Assistant Postmaster General say if that was the correct figure?

Mr. Gammans said if Mr. Winterbottom understood the figure to be £17, then he knew far more about it than he (Mr. Gammans) did, because the Post Office had had no communication whatever from the radio industry that it was likely to be anything like that sum.

Mr. Charles Orr-Ewing said it was absolutely impossible to work out the price for such an adaptor until the technical information was available. It was quite unreasonable for Labour members to publish false information to try to deceive the House and the country.

Calder Hall Atomic Station

In reply to questions by Mr. Nabarro, Mr. Sandys, Minister of Supply, said that the projected atomic power station at Calder Hall was an experimental one and he was not at present prepared to commit himself to estimates of the completion date, the planned electrical capacity, or the cost. Discussions about the appropriate financial arrangements were at present proceeding with the British Electricity Authority, whose technicians would be given such information as they might require in connection with their future plans.

Development in Wales

Mr. Gower asked the Minister of Fuel and Power if he would take steps to ensure that the future development of the electricity and gas industries in Wales was governed by a dominant consideration for the needs of the Principality.

Mr. Joynson-Hicks, Parliamentary Secretary, said that the Minister would not hesitate to take such steps as he might at any future time think necessary, but at present he had no reason to think that the needs of Wales and Monmouthshire were not the dominant consideration in the development of the two industries there.

Increased Pensions

Mr. George Thomson asked the Minister of Fuel and Power on what date he proposed to award the increased pensions which he had undertaken to give to former employees of local authority electricity and gas undertakings; and how far the increased pensions would be retrospective.

Mr. Joynson-Hicks said that the schemes, when completed, would be retrospective to 1st October, 1952, for both industries, and advance payments were meanwhile being arranged.

New A.P.V. Works

THE rapid growth of the A.P.V. Co., Ltd., in recent years had resulted in an unwanted dispersal of its production facilities among four factories. Consequently the company decided to move all its production facilities and head office to a new factory and foundry in the New Town at Crawley, Sussex.

This move is being carried out in two stages. The first stage is now completed and includes the fitting, machine, press and polishing shops and also the foundries which are under the control of the subsidiary company, A.P.V.-Paramount, Ltd. The head office and the coppersmith shops remain at Wandsworth and will constitute the second stage of the move. About 1,400 people are involved, and houses are being provided in Crawley New Town for all who require them.

Last week we visited the factory and foundries which occupy a 17 acre site. They have an area of 200,000 sq ft and are the largest works in Crawley New Town. The factory and the foundries form entirely separate blocks with their own administrative offices.

The factory floor space is 128,800 sq ft: there are five 475ft bays with parts of three further bays which will be extended later. The frontage is taken up by the works offices. The layout provides for a general flow of production from the front to the rear. The stores take up the front ends of the bays and are served by a large goods entrance which forms the most noticeable feature of the frontage. The machine, press and polishing shops stretch across all bays while the fitting shop occupies most of the large 60ft bay and one other.

The foundry building consists of two 60ft main bays 250ft long, one housing the stainless steel foundry and the other the aluminium and copper-base alloy foundries. A 20ft middle bay contains the furnaces and their auxiliary equipment including the generators. The stainless steel furnaces are high frequency and are tilting types but the aluminium furnaces are oil-fired. The offices, stores and pattern shops occupy the frontage of the building and the fettling shops the rear end. X-ray and other test rooms run along the side of the aluminium foundry. A large fume and dust extraction plant has been installed and the working conditions are unusually bright and clean for a foundry.

E.T.U. Conference

Structure of Electricity Supply Industry

AGAINST the opposition of the Executive Council the conference of the Electrical Trades Union, which continued at Clacton last week, carried a resolution criticizing " the practice of creating new posts in the electricity supply industry, thereby causing an out-of-balance structure." The opinion was further expressed that experience during the past four years had shown the necessity for stricter control in this sphere of administration. The resolution called upon the Executive Council to press for the establishment " forthwith " of special standing committees comprising elected representatives of Boards' employees at Divisional, Area, Sub-Area and local level which would meet at regular intervals to examine the present structure, fix the numbers of establishment, and have all proposals for increases and decreases of establishment referred to them.

A further resolution, carried with the support of the Executive Council, viewed with deep concern conditions existing in the nationalized electricity supply industry. It felt that the present personnel, " who in the main were antagonistic towards the idea of nationalization," were to blame. The resolution urged that the Executive Council should take steps towards training members to take control of the industry and to this end to pursue, through the T.U.C. and the Labour Party, a policy for the redrafting of the Electricity Act.

In a fraternal address, translated by an interpreter, Mr. Chang Tsan Ming, president of the Electrical Workers' Trade Union of China, said that many Chinese workers had become directors of industry. Two electrical workers were directors of electrical authorities.

Earlier, the conference had carried a resolution relating to the wages and conditions of manual workers in the electricity supply industry which it was contended should be brought into line with those of clerical, administrative and technical grades.

Among a wide variety of other subjects discussed during the week was that of equal pay for women. A resolution, carried unanimously, demanded that women in the engineering industry should receive " the rate for the job," whether skilled or unskilled, and that no woman should be paid less than the plant labourer's rate. Mrs. D. Goldman (North Woolwich), the only woman delegate, called upon the members to fight for the principle and not accept it complacently year after year. Later the conference supported a resolution asking the Executive to take steps for the specific organization of women in all sections of the industry, particularly radio.

After Mr. Arthur Greenwood, P.C., M.P., chairman of the Labour Party and a former Minister of Health, had addressed the delegates he was handed a cheque for £500 representing a contribution from the Union to party funds. During the week Mr. Foulkes also presented a cheque for £50 to Mr. K. Elliott, J.P., chairman of the Clacton U.D.C., in aid of a local charity of his selection. Union gold medals were presented to Messrs. J. E. Maguire (Liverpool), F. Morrison (Edinburgh), F. Sharpe (Lincoln) and T. F. Tynan (Odsal).

Mr. Frank Foulkes, president, handing a cheque to Mr. Arthur Greenwood, chairman of the Labour Party

NEUTRAL EARTHING

Tests on 33 kV Liquid Resistor

FOLLOWING the decision to change from solid to resistance earthing of the neutral of the 33 kV system fed from Percival Lane generating station at Runcorn, Cheshire, the design and construction of suitable earthing resistors of the liquid type was undertaken by the Merseyside and North Wales Division of the British Electricity Authority. To meet existing earth fault protection equipment, the minimum initial earth fault current had to be of the order of 1,000 A. The resistors have been designed to have a time rating of 30 sec and a volume of about 1,300 gall. The tank is hot dipped galvanized overall and the electrolyte is a weak solution of distilled water and sodium carbonate. The bushing has been supplied by Bullers, Ltd.

The main features of the design (Fig. 1) follow conventional lines and to minimize local voltage and current stressing the top and bottom edges of the electrode are curved inwards. The bushing and electrod are so arranged that no supplementar insulation of the conductor or electrode i required. All under-water insulation is thr porcelain. The area of the electrode i about 4,000 sq in, so that under maximum fault conditions the current density is les than 1 A/sq in.

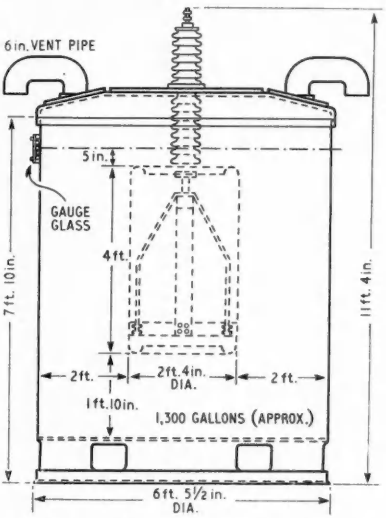


Fig. 1.—General arrangement and dimensions of 33 kV liquid earthing resistor

After the installation of the first unit, full voltage and practically full power tests were carried out on 21st and 22nd March. Five tests were made, one of 3 sec, two of 5 sec and two of 30 sec nominal duration. The 30 sec tests were actually of 28·5 and 27·5 sec duration, as checked from the oscillograph records, and the results of these are shown in Fig. 2. It will be noted that the initial current (Test 3) was 1,000 A rising to about 2,000 A after 28 sec. The initial temperature of the liquid for this test was 16 deg C and the final temperature 70 deg C at the top of the electrode and 60 deg C at the bottom.

For Test 5 the conditions were more onerous, as the initial temperature of the liquid was 44 deg C. The initial current was 1,600 A rising to about 2,400 A after 25 sec and falling slightly to 2,300 A at 27·5 sec. After about 27 sec boiling developed rapidly, accompanied by the typical muffled boiling sound and some steam emission. There was no audible sound of local boiling until general boiling took place. The test switch was opened by hand when this occurred. One of the manhole-vent covers was left off for observation and cine-camera records, but no water was thrown from this opening or from the remaining vent pipe. There was no visual indication that flashover had taken place, and this was confirmed by subsequent examination of the oscillograph record and of the electrode and bushing. The liquid temperature at the top of the electrode was, of course, 100 deg C and at the bottom it was 90 deg C.

During the 27·5 and 28·5 sec runs the voltage across the resistor fell from about 18 kV to 16 kV and 16·5 kV respectively.

This was due to the reactance drop over the 132 kV line and 45 MVA and 20 MVA transformers used for the tests, increasing as the current increased, while the nominal applied voltage remained constant at 19 kV.

Based on these tests, with an initial electrolyte temperature of 15 deg C and current of 1,000 A, the final temperature should not exceed 70 deg C after 30 sec, i.e., a temperature rise of 55 deg C. With an initial temperature of 30 deg C and corresponding current (based on 15 deg C) the final temperature should not exceed 95 deg C after 30 sec, a temperature rise of 65 deg. These figures, of course, are based on the use of an electrolyte similar to that used for these tests.

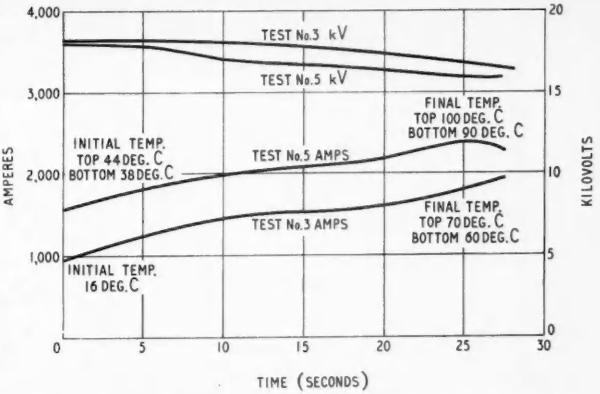


Fig. 2.—Variation of current through and voltage across liquid resistor

Electrical Research

Reports on the Work of the E.R.A.

METHODS of raising soil temperature are discussed under the two main headings of soil warming and soil sterilization in Report Ref. W/T26, " The Use of Electricity to Increase Soil Temperature " (9s), by E. W. Golding, M.Sc.Tech., M.I.E.E., Mem. A.I.E.E., which has recently been published by the E.R.A. Brief descriptions of the necessary methods and equipment are given, and emphasis is laid upon the energy consumption for specified temperature rises, and on the temperature distribution in the soil, under conditions which occur both naturally and with different arrangements of the heating elements. The influence of temperature gradient upon the technique required for practical application by electrical methods is discussed. The researches of the Electrical Research Association on electrical soil warming and soil sterilization are briefly described and some of the results obtained are given.

In another recent publication, Report Ref. V/T105, " Deterioration of Insulation by Electrochemical Agents: Moisture Detection by Tests at Very Low Frequencies " (12s), by G. Mole, Ph.D., F.Inst.P., and D. C. G. Smith, B.Sc., a new method is examined in which the vector admittance of the insulation is measured over a range of low frequencies (0·18—56 c/s) to yield the relation of the measured conductance G_m to the measured capacitance C_m. Moisture displaces the characteristic. If the position for the dry condition is known, moisture may thus be detected. In addition there is some experimental evidence that the absolute slope of the characteristic curve may measure the moisture content. Results are given of tests on resin-bonded paper board, current transformers and bushings. The equipment is at present in experimental form but is capable of development to meet the requirements of portability and speed of use for testing insulation in the field.

Measurements on the minimum energy necessary for the ignition of methane-air gas mixtures by capacitive spark discharges are

described in Report Ref. G/T278, "The Ignition of Methane-Air Gas Mixtures by Capacitive Spark Discharges" (7s 6d), by H. G. Riddlestone, B.Sc.(Eng.), A.C.G.I., D.I.C. The effects of circuit voltage, resistance and inductance on the incendivity of the discharge were determined with ignition apparatus described, and the corresponding electrical characteristics were measured by using the method and equipment described in Report Ref. G/T253.

Flameproof Equipment

In Report Ref. G/T274, "Flameproof Electrical Apparatus: Flanged Joints, One Half-Inch in Radial Breadth, in Mixtures of Acetone Vapour and Air" (10s 6d), by H. Robinson, J. T. W. Roper and H. L. Williams, it is shown that for mixtures of acetone vapour and air exploded in an 8-litre bronze sphere provided with smooth horizontal equatorial flanges 0·5in in radial breadth, the most incendive mixture contains 5·2 per cent acetone vapour by volume. The most readily ignitable external mixture contains 6·8 per cent acetone vapour by volume. The maximum experimental safe gap associated with this combination of internal and external mixtures, on a criterion of n=20, k=0·001in, is found to be 0·034in; and the statistical maximum safe gap, calculated by the improved method recently adopted, to be 0·025in.

The effect on the maximum safe gaps, experimental and statistical, of reducing the flange breadth from 1in to 0·5in cannot be accurately assessed because of differences between the criteria adopted in the 1938 investigation which determined the data for 1in flanges (Ref. G/T110), and in this investigation. The safe gaps for 1in flanges are scheduled for re-determination in order to clarify the effect of the reduction in flange breadth. The tests were made at Buxton in co-operation with the S.M.R. Establishment of the Ministry of Fuel and Power.

Report Ref. G/T271. "Flameproof Electrical Apparatus: Flanged Joints One Half-Inch in Radial Breadth, with Atmospheres of Normal Butyl Alcohol and Air" (10s 6d), by H. Robinson and H. L. Williams, deals with the third of a series of investigations to determine the effect on the maximum safe gaps, experimental and statistical, of reducing flange breadth from 1in to 0·5in. The first and second investigations dealt with pentane and heptane respectively; the present report is concerned with the vapour of normal butyl alcohol.

In the course of the investigations on pentane and heptane, some doubt arose as to whether the apparent effect of reducing flange breadth from 1in to 0·5in might not be due to improvements introduced in the experimental method during the years that had elapsed since the safe gaps for 1in flanges were first determined; a re-determination of these latter gaps, using present-day experimental methods, was therefore included in both investigations. In the current investigation on normal butyl alcohol, a similar re-determination would have been desirable as a check on the figures quoted in Reference G/T160, but on grounds of urgency, it was deemed expedient not to proceed with it (at this stage, at any rate). The results presented in this report therefore refer only to tests made with flanges of 0·5in radial breadth.

Pest Control

Report Ref. W/T23, "Pest Control by High Frequency Electric Fields: Critical Résumé" (24s), by A. Morris Thomas, B.Sc., F.Inst.P., M.I.E.E., is claimed to be an authoritative statement on the use of high frequency electric fields for pest control. It comprises an account of the relevant physical and mathematical theory with applications, parts of which are original, together with a review of the literature and some suggestions for further experimental investigation.

Copies of these reports are available from the British Electrical and Allied Industries Research Association, Thorncroft Manor, Dorking Road, Leatherhead, Surrey.

I.E.E. Southern Centre

THE summer meeting of the Southern Centre of the Institution of Electrical Engineers will be held on 12th June, when members and their ladies will visit the Isle of Wight. The tour of the Island will include a visit to the works of Saunders-Roe. As the ladies will be unable to visit the works an alternative item has been arranged for them. The Southampton party will leave Southampton for Cowes, and the Portsmouth party for Ryde. The cost per head from Cowes and Ryde, including coach, lunch and tea, but excluding boat fare, will be £1 1s for members and 15s for students. Those wishing to attend should notify Mr. C. G. Brame, Southern Electricity Board, Magdalen Road, North End, Portsmouth, by 4th June.

National Physical Laboratory

Progress During the Past Year

TO give engineers and physicists an opportunity of familiarizing themselves with the research and development work which is being carried out at the National Physical Laboratory under the directorship of Dr. E. C. Bullard, F.R.S., the annual "open day" was held on Friday last. At the same time the N.P.L. report for 1952 was published by H.M. Stationery Office for the Department of Scientific and Industrial Research, price 2s 6d (65 cents U.S.A.).

The main problem for the N.P.L. during 1952 was that of obtaining maximum progress on the most important items of research with an inadequate staff, research work for defence having taken up an increasing proportion of the Laboratory's resources. This has meant that short-term investigations have been undertaken at the cost of the N.P.L.'s traditional and fundamental tasks, a state of affairs which is deplored by the Committee.

As the N.P.L. began its work in 1900 at Kew Observatory and later took over much of the Observatory's work on standardization of instruments it is of interest to recall the origins of this type of work. A small exhibition of historical apparatus and records was therefore arranged last week with emphasis on the accurate calibration of barometers, which began at Kew in 1853. Included in the Exhibition were two standard barometers of 1854 and 1858, together with the original records of tests. Early tests on thermometers, as well as a number of unique exhibits, were also featured.

Aerodynamics

Most of the research done by the Aerodynamics Division was work for the Ministry of Supply and concerned high-speed flight. The stability and flutter of swept back and delta wing forms of subsonic, transonic and supersonic speeds were studied theoretically and in wind tunnels. The research on boundary layer suction on wings to maintain laminar flow has continued and it is planned to extend it to fuselages. The new High-Speed Laboratory is nearing completion and it is hoped that the 36in by 14in high-speed tunnel will be installed and working this year. Construction of the 25in by 20in high-speed tunnel has started.

The Light Division has developed and improved methods of producing diffraction gratings by the use of the Merton nut. It has also made linear scales of exceptional accuracy by flash projection of the image of a slit on a photographic plate advanced by a Merton nut.

Colour Measurement

The Colorimetry Section was presented with new problems of measurement when fluorescent inks and pigments were placed on the market. The brilliance of these colours is due to the absorbed light being transformed and emitted as fluorescent light. It is possible, for example, for a red ink to emit more red light than there is in the light shining on it. Colour measuring instruments were therefore useless but the section has been able to develop a successful technique of measurement.

In last year's report there was a reference to transparent electrically conducting films on glass, which were then in the early stages of development. Remarkable results have now been obtained with gold films on a layer of bismuth oxide. They are of a pale straw colour and they transmit at least 75 per cent white light. The electrical resistance is as low as 6 to 7 ohms per "square." This film seems to be suitable for laminations and it is being tested commercially.

The "Ace" pilot model in the Mathematics Division has been working almost continuously throughout the year, defence problems having occupied most of its time. Its performance has been good, the level of serviceability being at least 60 per cent. Arrangements have been made with the English Electric Co., Ltd., to make an engineered version of the Ace. It will be

called " Deuce " and will be installed in the former 4ft wind tunnel. A magnetic drum store is being developed by the Electronics Section for addition to the " Ace " pilot model. It is 4in in diameter and 4in high, and it has 16 writing and 16 reading heads.

Both sets can be shifted axially to a second position, so that 32 tracks on the drum can be used. Each track has room for 32 numbers so that the total " memory " capacity is 1,024 numbers, each equivalent to 10 decimal digits. The rotation of the drum has to be synchronized with the rest of the computer and its speed has therefore to be accurately controlled to a constant value. Its phase, or position, is in fact determined at every instant to within one five-thousandth of its circumference.

Metallurgical Investigations

It has been found in the Metallurgy Division that iron containing quite small amounts of carbon possesses great toughness at low temperatures and high yield stress when it is cooled rapidly enough from above 900 deg C. Materials have been developed which would be satisfactory for a steel plate 1in thick with freedom from brittleness at temperatures well below 0 deg C. The Metallurgy Division also discovered that complete removal of phosphorus made incompletely hardened steel as strong and tough as completely hardened steel with the normal phosphorus content. Phosphorus is used, in fact, to ensure that steel is properly hardened during heat treatment. A series of detailed experiments has begun on this subject.

The determination of the melting point of titanium is difficult because of the metal's highly reactive nature. No refractory material is known which does not contaminate the molten metal, therefore conventional methods of determining its melting point cannot be used. Since it is difficult to conceive a method in which contact with refractories or other metal can entirely be avoided, a technique has been devised to reduce the possibility of contamination to the minimum while the melting point is determined under approximately black body conditions.

The melting points of nickel and iron determined in the apparatus agree within 2 deg or 3 deg C and that of platinum within 10 deg C of the accepted melting points of these metals. The melting point observations obtained for titanium are reproducible to within 2 deg or 3 deg C and a mean value of 1,660 deg C is considered to be accurate within ± 10 deg C, which is the estimated accuracy of the pyrometer.

In the Electricity Division work has continued throughout the year. The investigations included temperature coefficient and stability tests on nickel-chromium-aluminium wires, the calibration of wavemeters at frequencies above 30,000 Mc/s, the measurement of dielectric constants of standard liquids, and research on the insulating properties of alumina at temperatures up to 1,500 deg C.

In the Physics Division the bulk of the work has been devoted to the testing of lifting gear. Another problem with which this division has been concerned is the reduction of noise from jet engine test houses. Experiments have been made on the effectiveness of absorbent ducts as silencers. Tests were made at a number of modern test houses using both the engines and loudspeakers as the source of noise.

Canadian Power Schemes

A CONTRACT to treble the length of the Lajoie storage dam on the Bridge River in British Columbia, making it one of the largest civil engineering structures in Canada, has been let by the B.C. Electric Company. The cost will be over $8 million. The dam, now 1,100ft long and 225ft high, is to be enlarged to 282ft in height and 3,390ft in length. It will then impound enough water to operate five turbines developing 310,000 h.p. at the company's Bridge River plant.

Tentative approval of a development of 48,000 h.p. in north-west New Brunswick has been given by the International Joint Commission sitting in Washington. The project, planned by the New Brunswick Government, is for a development at Beechwood, between the towns of Perth and Bath, which would assist the expansion of the pulp and paper industries in the area. The Commission says that the scheme is " consistent " with the overall plan for the development of the St. John river, which runs through Maine, Quebec Province and New Brunswick. Power proposals for the entire river have been under consideration since 1950. The Commission now expects to complete its engineering report by 1st June, and will prepare recommendations for consideration by the Canadian and United States Governments.

COMMERCE and INDUSTRY

Public Lighting Conference Arrangements

Large N.A.T.O. Contract

THE annual conference of the Association of Public Lighting Engineers is to be held this year in Liverpool from Tuesday, 15th to Friday, 18th September inclusive. Already a large number of members have indicated their intention of being present as well as delegates from local authorities and Gas and Electricity Boards. Papers dealing with various aspects of street lighting will be presented at the conference sessions. There will also be an exhibition in St. George's Hall, opposite the Picton Hall, in which the conference sessions are to be held. In addition, in St. John's Gardens, adjoining St. George's Hall, there will be a display of various types of steel and concrete lamp columns, bollards, tower wagons, etc.

Rhodes Centenary Exhibition

The electrical exhibitors at the Rhodes Centenary Exhibition which will be held in Bulawayo from June to August will include W. T. Henley's Telegraph Works Co., Ltd., who will be exhibiting on the stand of their agents, J. Clack & Co., Ltd., telescoped samples of various cables, among which will be solid type, gas-cushion type and oil-filled cables, for operating voltages up to 132 kV. There will also be a representative range of electrical distribution equipment, including distribution pillars, joint boxes, service fuses, etc., and a model showing a typical rising main system.

The exhibit of British Insulated Callender's Cables, Ltd., will comprise a comprehensive range of cables and accessories which will include high voltage cables of the oil-filled and impregnated pressure types; mass-impregnated non-draining cables; low voltage paper insulated cables; rubber insulated and p.v.c. insulated cables and flexibles; power capacitors; current collector equipment for cranes and conveyors; claw-type cable cleating system; mining type straight joint box; bolted flameproof couplers; pressed copper service box joint; consumers' insulated service unit; and detachable fused tee box.

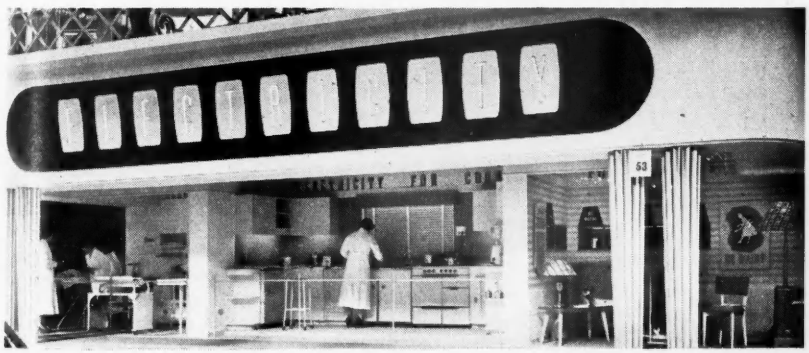
Chair of Electrical Engineering

The Council of King's College, Newcastle-on-Tyne, is appealing for £250,000 to further the College's activities. It is proposed, among other things, to create a new Chair of Electrical Engineering. So far various firms have promised £41,500. These include C. A. Parsons & Co., Ltd., and A. Reyrolle & Co., Ltd., who are giving £5,000 each.

Electricity at the Dublin Spring Show

The accompanying picture shows one of the stands of the Republic of Ireland Electricity Supply Board at the recent Royal Dublin Society's Spring Show. On the domestic electrical appliances stand a staff of lady demonstrators gave continuous demonstrations of electric cooking and electric laundry equipment

The domestic electrical appliances stand of the Republic of Ireland Electricity Supply Board at the Royal Dublin Society's Spring Show



for the five days of the show. These attracted large crowds throughout the day. On the rural electrification stand the Board showed and demonstrated domestic as well as farm appliances of all kinds.

American Gas Industry

The latest Productivity Team report issued by the British Productivity Council, 21, Tothill Street, London, S.W.1, deals with the United States gas industry. It is a well-illustrated 195-page volume priced at 8s 6d post free.

The team seems to have been impressed by the amount of " integration " of gas and electricity in the United States. It points to substantial economies in administration achieved through combination of the two services as well as to the " more balanced " development which has been possible. It is suggested that a closer study of the subject than the team was able to make would be worth while.

Among other points in the report is a recommendation that sales of approved gas appliances by manufacturers and dealers should be encouraged in Great Britain " as leading to an extension of goodwill and of the public's knowledge of the service gas is able to offer."

Chelsea Flower Show

The Electrical Development Association's stand at the Royal Horticultural Society's Show, which is being held this week at Chelsea, has for its theme " Electricity Aids the Gardener."

The exhibit stresses the value of electricity for out-of-season production and early cropping, particularly for gardens without heated glass. The use of 400 W high pressure mercury vapour lamps for the light irradiation of tomato seedlings is illustrated in accordance with the practice established by the John Innes Horticultural Institution. There is a bench provided with a mains voltage soil warming cable for the propagation of seedlings and cuttings without the use of a heated greenhouse. A frame hotbed is provided with l.v. soil warming for the early production of lettuce and salad crops in cold frames, and electrode units for the sterilization of soil. Other items of interest are rod type thermostats for the economical maintenance of predetermined temperatures in soil warming installations, and automatic " Aerosol " equipment for the protection of plants at all stages against the ravages of pests.

Prefabricated Bungalows

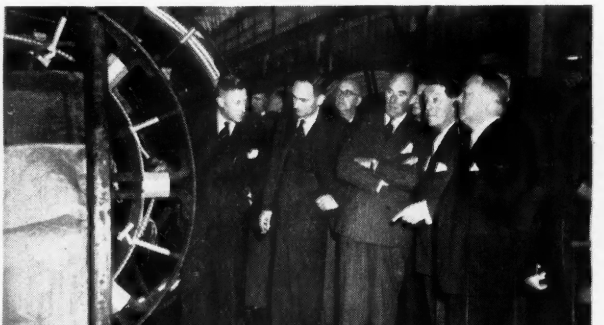
With reference to the notice relating to the new form of prefabricated bungalow published in our issue of 8th May, Hurseal, Ltd., informs us that the heating is by means of its oil filled electric safety radiators.

Works Visits

More than 100 of the delegates attending the annual convention of the Institution of Locomotive Engineers at Southport were invited to the Prescot Works of British Insulated Callender's Cables, Ltd., on 8th May. The visitors, including Mr. C. M. Cock, president of the Institution, were welcomed on behalf of B.I.C.C. by Mr. E. Bowyer, manager (production), Mr. L. R. B. Spence, Prescot works manager, and Mr. O. J. Crompton, an executive director of the B.I.C. Construction Co., Ltd. The visitors were conducted round the power cables department, the wire and rolling mills, medium and fine wire drawing shops, the copper refinery and the department concerned with traction fittings.

Senior members of the teaching staffs of universities and technical colleges visited the research laboratories of B.I. Callender's Cables, Ltd., at Wood Lane, Shepherd's Bush, on 12th May, and the laboratories of British Telecommunications Research, Ltd., Taplow Court, Bucks. The visit was arranged by the University Liaison Office. The visitors were welcomed at Wood Lane by Dr. L. G. Brazier, director of research, B.I.C.C., and at Taplow Court by Brigadier J. B. Hickman, managing director, B.T.R.

Members of the Institution of Locomotive Engineers in the power cables department of the Prescot Works of B.I.C.C., including (left to right) Mr. R. C. Bond, president-elect of the Institution, Mr. G. T. Hart, secretary, Mr. C. M. Cock (president), Mr. E. Bowyer, manager (production), B.I.C.C. and Mr. S. Warder, chief officer (electrical engineering), Railway Executive



On 5th May Venezuelan Press representatives visited the Strowger Works, Liverpool, of the Automatic Telephone & Electric Co. and were conducted round the factory by members of the administrative staff. The members of the party included Senor Aristides Parra (director of the government broadcasting station, Radiodifusora Nacional), Senor Jose Moradell (assistant chief editor of *El Nacional*, Caracas), Senor Miguel Angel Garcia (editor for economic affairs *El Universal*, Caracas), and Senor Marco Aurelio Rodriguez (an editor of *La Esfera*, Caracas). The party was accompanied by Senor Esteban Maccragh from the British Embassy, Caracas, and Mr. C. W. Bedford of the Central Office of Information, Manchester. The visitors were shown the processes involved in the manufacture of automatic telephone equipment.

Educational

A course of four lectures on "Solid-State Electronics" will be given by Dr. Karl K. Darrow of the Bell Telephone Laboratories, New York, from 22nd to 26th June at King's College, Strand, London, W.C.2. Admission will be free.

Coronation Brochure

We have received from Painter Brothers, Ltd., of Hereford, an attractively produced Coronation brochure, containing route maps from London to Hereford for the guidance of visitors to the company's works. The route has been delineated in the style adopted by John Ogilby, cosmographer to Charles II.

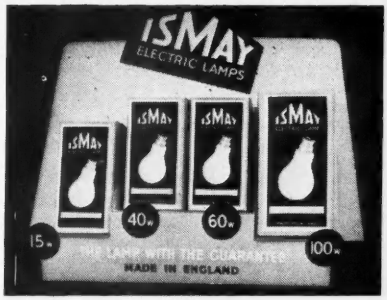
Prices of Materials

In the accompanying table we give the prices of the more important materials used in the electrical industry. The figures are those quoted on Monday last.

ALUMINIUM Ingots	.. ..	ton £161 0s 0d
COPPER, H.C. Electro	.. ..	ton £253 0s 0d
Fire Refined 99·70 per cent	..	ton £252 0s 0d
Fire Refined 99·50 per cent	..	ton £251 0s 0d
COPPER Tubes ..	.. ..	lb 2s 6¾d
Sheet ..	.. ..	ton £306 10s 0d
H.C. wire and strip	.. ..	ton £282 15s 0d
LEAD, English ..	.. ..	ton £82 5s 0d
Foreign ..	.. ..	ton £81 0s 0d
MERCURY..	.. ..	flask £70 10s 0d
TIN	.. ..	ton £755 10s 0d
ZINC, G.O.B. Foreign	.. ..	ton £71 15s 0d
Electrolytic	.. ..	ton £70 10s 0d
BRASS Tubes ..	.. ..	lb 2s 1d
Sheet ..	.. ..	ton £243 Cs 0d
Wire ..	.. ..	lb 2s 6¼d
PHOSPHOR BRONZE		
Wire ..	.. ..	lb 3s 9¾d
RUBBER, No. 1 R.S.S. spot	..	lb 21d–21¼d

Lamp Display Stand

Ismay Lamps, Ltd., has recently introduced a display stand suitable for either counter or window displays. This is coloured red and blue



New Ismay lamp display stand

and measures approximately 14in by 11in. The stand has been designed to show lamps of various wattages in their actual packing.

Equipment for European Defence

An order for mobile fire-control radar equipments, worth over four million dollars, has just been placed with the British Thomson-Houston Co., Ltd., by the United States Army, European Headquarters Command. These equipments are intended for the N.A.T.O. countries. The contract has been placed under the current offshore procurement programme, and is similar to that placed with the B.T.H. Co. last year for the same kind of military electronic equipment

Pressed Metal Industry

The British Productivity Council, 21, Tothill Street, London, S.W.1, has published (at 3s including postage) a report on the British pressed metal industry prepared by an American team which visited this country in 1951. It deals with such matters as organization and management, standardization, materials handling, plant layout and maintenance, product design and engineering, safety and labour conditions, comparing American with British practice.

Lucas Conference

At a conference of agents and traders of Joseph Lucas, Ltd., at the Grand Hotel, Harrogate, on 19th May, four hundred motor agents and traders were given an insight into recent developments in the design of car lighting equipment by Mr. J. H. Nelson, Ph.D., F.I.E.S., A.M.I.Mech.E., senior lighting engineer of Joseph Lucas, Ltd. The Mayor of Harrogate, Councillor Eric F. Oddy, was among the guests. At the reception guests were welcomed by the conference chairman, Mr. J. Masterton (sales director), supported by directors of Joseph Lucas (Sales & Service), Ltd., and Joseph Lucas (Batteries), Ltd. After lunch and an address of welcome from Mr. Masterton, members saw

the new Lucas battery film. At dinner in the evening Mr. Masterton proposed the toast of the guests to which the Mayor of Harrogate and Mr. Ian Appleyard responded. During the conference guests were able to view various working exhibits which included a lighting demonstration and samples of window display units.

New Zealand Tariff Inquiries

The New Zealand Board of Trade proposes to inquire into the rates of import duty on domestic refrigerators and domestic clothes-washing machines. In addition the Board will consider the desirability of re-classifying these goods and whether they should be exempted from import licensing requirements. The inquiries are to be held in September next. United Kingdom interests proposing to submit evidence are asked to advise the Board of Trade, Commercial Relations and Exports Department, Horse Guards Avenue, London, S.W.1.

Economics of Metering

In the discussion on the I.E.E. paper concerning the economics of metering (15th May issue, p. 1106) Mr. F. H. Dennis was unfortunately reported as criticizing the size of the samples given in the paper, whereas his remarks were confined to the method used for the selection of the sample and the sampling error in the average consumption per consumer.

Trade Announcements

William McGeoch & Co., Ltd., announce that they will remain open at Whitsuntide, but close for the Coronation from Friday evening, 29th May, to Thursday morning, 4th June. The summer holidays will be from 24th July to 5th August.

Mattis Industries, Ltd., 4, John Adam Street, Adelphi, London, W.C.2, have been appointed sales representatives for London and the Home Counties area for the "Milaflex" range of electrical insulating silks, tapes and cable cloths manufactured by **Miller & Ferguson, Ltd.**

J. H. Tucker & Co., Ltd., have appointed Mr. W. C. Waterfield as their district sales representative for the West Midlands area, in succession to Mr. A. J. Gardner who has now left their employ.

Catalogues and Lists

Sturtevant Engineering Co., Ltd., Southern House, Cannon Street, London, E.C.4.—Illustrated technical booklet on lime hydrating (Knibbs process) (9802).

Ekco-Ensign Electric, Ltd., 45, Essex Street, Strand, London, W.C.2.—Priced leaflet on the "Ekco" combined window spotlight and floodlight.

Carter Gears, Ltd., Thornbury Road, Bradford, Yorks.—Illustrated catalogue containing full particulars of the company's complete range of hydraulic variable speed gears from $\frac{5}{8}$ h.p. to 22 h.p.

T. B. Morley & Co., Ltd., Jameson Street, Hull.—Three leaflets illustrating three-light pendants (36/453), flakestone bowls (37/453) and galleries and gallery sets, and fittings accessories (38/453).

Arcolectric Switches, Ltd., Central Avenue, West Molesey, Surrey.—32-page illustrated catalogue of "Arcolectric" switches and signal lamps (128).

Edison Swan Electric Co., Ltd., 155, Charing Cross Road, London, W.C.2.—Two folders giving details of the "Avon" and "Windsor" ranges of electrical accessories.

Hellermann, Ltd., Tinsley Lane, Crawley, Sussex.—Illustrated folder describing the new "Helvin" pressure bung (BH.501).

Babcock & Wilcox, Ltd., Babcock House, Farringdon Street, London, E.C.4.—Three publications showing sectional arrangements and details of chain grate stokers—Style 6 (1542), Style 133 (1543) and Style 28 (1544).

Meritus (Barnet), Ltd., Wood Street, Barnet, Herts.—Illustrated leaflet giving details of industrial lighting brackets and low voltage transformers.

Pressed Steel Co., Ltd., Cowley, Oxford.—Leaflet describing the new model CC.60 ice cream conservator.

G.W.B. Electric Furnaces, Ltd., Dibdale Works, Dudley, Worcs.—Catalogue illustrating the new "Autolec" thermal storage system for space heating (TS.552A).

The Coronation

THE I.E.E. Council has arranged that the Institution building shall be open for the use of members and their guests during the evenings in Coronation week from 2nd to 5th June inclusive. In view of the large crowds which are expected on the Embankment on those evenings, and because the building would not normally be open after 6 p.m., admission from then until 11 p.m. will be by ticket only, which should be obtained not later than a week before the date for which it is required.

Each member may obtain four tickets available for use on the evening specified thereon. The price of each ticket, 2s 6d, will cover the cost of buffet refreshments, which will be available from 6 p.m. until 10.30 p.m.

Applications for tickets, stating the date for which they are required, should be sent as soon as possible to the secretary of the Institution, with the appropriate remittance.

Trade with America

Further Statement on Policy

SPEAKING at the annual luncheon of the British Engineers' Association at the Mayfair Hotel, London, W.1, on 14th May (with Mr. D. D. Walker, president, in the chair), Mr. Lincoln Gordon, Minister for Economic Affairs at the American Embassy, London, stressed the importance which the new administration in Washington attached to the development of a sound programme for a higher level of international trade.

In the course of his speech he said that the subject of equipment for Government hydro-electric projects had recently been much in the public eye. On the Chief Joseph Dam case itself, which was still pending, Secretary of Defence Wilson's statement which had appeared in the press the day before spoke for itself. But this was not the only case. Since January, 1952, the U.S. Bureau of Reclamation had made 19 awards for electrical equipment to foreign firms in open competitive bidding. In the same period the Bonneville Power Administration had awarded five contracts for foreign-made electrical equipment, including one at the Folsom Dam to the English Electric Co. Last year the Army Corps of Engineers awarded a contract for plant for the huge Garrison Dam to Ferranti's. During all this period the Buy American Act was in force.

Chief Joseph Dam Contract

Mr. Wilson's statement, referred to by Mr. Gordon, was to the effect that although he had rejected a low British tender to supply electrical equipment for the Chief Joseph Dam in Washington State, he wanted to accept it because of the "Trade not Aid" policy of the Eisenhower administration. The British bid was almost $1 million (£357,000) less than the bids of the nearest American competitors. All bids were refused because of unsatisfactory specifications. In calling for new bids he had rejected the advice of the army engineers and the Secretary of the Army himself that an American bid should be accepted. But he discovered that the offer of the English Electric Co., Ltd., covered equipment with "25 per cent less copper, 20 per cent less electrical sheet steel and 10 per cent less price."

He did not think all the bids were made with the same specifications in view and he wanted to be very careful because he did not want to overrule the army engineers and then find he had made a mistake. The new specifications were "tighter" than the old ones.

Mr. Wilson said that he disagreed with the Buy American Act which compelled Government agencies to purchase from United States contractors, rather than from foreign contractors unless the price difference was more than 25 per cent. He was not in favour of this 25 per cent difference, but did not know to what level this should be reduced. Each contract had to be determined on its own merits.

British Tenders for Another Project

A *Reuter* message from Washington says that it has been revealed by United States Army officials that Ferranti, Ltd., submitted the lowest tender for a hydro-electric scheme on the Columbia River in the State of Oregon (the McNary Dam). The price was $857,600 and the next lowest offer ($898,081) was from the English Electric Co. American concerns also put in for the contract. It was stated that the bids were in process of being evaluated to determine which, in terms of efficiency, utilization of materials, etc., was the lowest bid.

The Washington correspondent of the *Daily Telegraph*, in reporting this matter, mentions also that Brown, Boveri, of Switzerland, have been awarded a contract for switchgear (valued at £1,230,000) for an atomic energy plant at Portsmouth, Ohio.

Cable for Seattle

It is reported by the Seattle correspondent of the *Daily Telegraph* that the Light Department of that city has signed a contract, valued at £36,820, with W. T. Henley's Telegraph Works Co., Ltd., for electric cables to be shipped from England in "three to five weeks' time." The nearest American tender is said to have been £54,670.

Connaught Bridge Station

A SOUVENIR booklet issued on the occasion of the opening of the Connaught Bridge power station in Malaya (*Electrical Review*, 3rd April) has been received from the Central Electricity Board. It contains a foreword by the chairman, Mr. O. A. Spencer, and besides a well-illustrated description of the station there is a brief history of electricity supply in the Federation. In connection with the opening of the station an exhibition of electrical appliances—the first of its kind in Malaya—was organized.

Employers and Negligence Claims

A Recent Decision

By F. E. SUGDEN

MANY employers consider that because their employees are covered by the National Insurance Act, which to a certain extent replaces the old Workmen's Compensation Act, no further claim can be brought against them by injured employees. There are injuries, arising out of and in the course of employment, which are now covered by the National Insurance Act, but where there has been negligence on the part of the employer or any of his staff or workmen resulting in injury to another employee there is common law liability.

In a case which recently occupied the attention of the Courts the plaintiff had been carrying out work at a warehouse belonging to the defendants, the hoisting of certain goods on to a wagon. The goods were being moved from the second floor of the warehouse down a shaft to the wagon by means of a sling connected to an electric hoist, which was under the control of a servant of the defendants. During the course of the loading the control failed, causing certain goods in the sling to fall. The plaintiff was struck across the back by these goods and was injured.

In the plaintiff's action alleging breach of statutory duty and/or negligence the judge found that there had been no breach of statutory duty because the employers had had the electric hoist periodically tested and had done all that was reasonable to keep it in perfect condition. So far as they knew it was free from defects; in fact the hoist had been tested for breaking strain periodically and it was quite modern and efficient. Unfortunately some unknown person or persons had maliciously tampered with the electrical equipment. The Court held, therefore, that the onus of proving that they were not negligent was on the defendants; they had to show that someone had maliciously tampered with the mechanism and this would exempt them from liability.

The judge stated that all the plaintiff had to do was to prove that he was carrying out his work at the warehouse belonging to the defendants using a hoist which was alleged to be under the control of the servant of the defendants, and that the goods fell on the plaintiff. The plaintiff agreed that the electrical gear was not tampered with by one of the defendants' employees, but he contended that there was an obligation on them to prove that they had taken reasonable steps to prevent such interference.

If the gear was tampered with negligently by one of the defendants' servants the defendants would most certainly be liable, but if the interference was malicious it would hardly be an act within the servant's employment.

The judge held that there was no evidence to show who had tampered with the electrical gear and therefore came to the conclusion that the obligation on the defendants was to prove that they were not negligent. If they could call evidence to prove that there had been interference by some person maliciously, it seemed to him that they had discharged the onus on them to prove that they were not liable. The judge agreed that the gear was tampered with by some unknown mischievous person for whose act the defendants had no responsibility. The defendants had satisfied him that they were not guilty of any negligence or breach of statutory duty and therefore the plaintiff failed in his action.

No doubt the defendants wondered why they should be called upon to show that they were not negligent, for surely it was up to the plaintiff to prove his case. In the normal way this would be so. But all a defendant need worry about is whether he could have prevented the accident, either by instructions or supervision or by not knowingly having a person who was unsuitable on the staff of the firm. If all these requirements are fulfilled there is nothing to fear.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Ring Main Unit

FERGUSON, PAILIN, LTD., Manchester, 11, have added to their range a ring main unit comprising a type "OFS" oil-immersed fuse-switch fitted with two cable boxes and mounted individually or, alternatively, with ring main oil-immersed switches on each side.

The equipment has a short-circuit rating of up to 250 MVA at 11 kV, the first switch having a 200 A rating and the oil-immersed switches a 400 A rating.

The type "OFS" fuse-switch is housed in a welded steel tank mounted on a fabricated angle-iron frame. The fuse links are in tubular carriers with contacts at each end, the three-phase assembly being operated by a self-contained spring-loaded mechanism. All three phases are opened by the operation of any fuse. The gear is fully interlocked.

The oil-immersed switches are of the quick break type and the associated mechanism can be locked in the "on," "off" or "earth" positions and operation from "on" to "earth" is rendered impossible. A current-potential testing device is provided which when inserted allows the switch to be operated only to the "off" position, automatically locking the device in the spouts and connecting it to the cable contacts.

Improvements have been made in the company's type "Q" l.v. high breaking capacity fuses and the range has been extended to cover all standard ratings from 200 to 300 A; extension to 800 A is in hand.

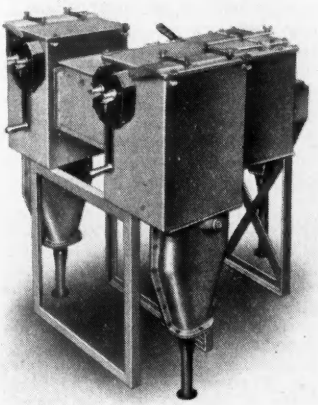
Internally Silica Coated Lamps

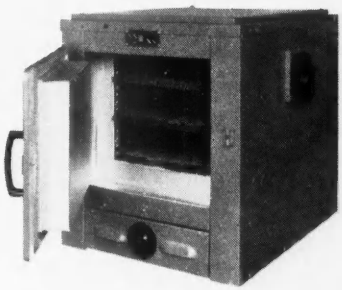
Because of the success achieved by internally silica coated lamps the ELECTRIC LAMP MANUFACTURERS' ASSOCIATION announces that as from 1st June next its members will be marketing the 40, 60 and 100 W lamps with single-coil filaments in addition to the present lamps with coiled-coil filaments. The list prices will be 1s 6d for the 40 and 60 W lamps, and 2s for the 100 W lamps (plus purchase tax). E.L.M.A. members will continue to market these ratings with coiled-coil filaments.

Welding Electrode Cabinet

A semi-portable, electrically-heated cabinet for the drying and storage of welding electrodes has been introduced by BARLOW-WHITNEY, LTD., Coombe Road, London, N.W.10.

It has a nominal capacity of 250 lb, is thermostatically controlled and is capable of operating at temperatures up to 250 deg C, with a rating of 1,200 W. The interior is divided into several compartments and attention has been paid to both heat distribution and ventilation. Another feature is the provision made for stacking





Left: **Ferguson, Pailin outdoor oil-immersed fuse-switch unit.** *Right:* **Barlow-Whitney welding electrode cabinet**

cabinets one above the other to form a multiple unit to save floor space.

The cabinet can also be supplied with a rating of 2·5 kW for temperatures up to 350 deg C, if required, and a larger cabinet with double the capacity is also available.

Grelco three-pin 13 A adaptor

Three-pin 13 A Adaptor

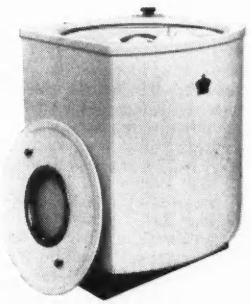
A three-pin 13 A two-way shuttered adaptor recently put on the market by GRELCO, LTD., Grelco Works, Hopcott, Minehead, Somerset, is available either fused or unfused. It is robustly constructed of moulded material and in the fused model the fuse can be replaced very quickly without undoing screws, removing covers, etc. The retail price of the fused adaptor is 9s 6d and the unfused model costs 8s 6d. Spare fuses cost 6d each.

Washing Machine

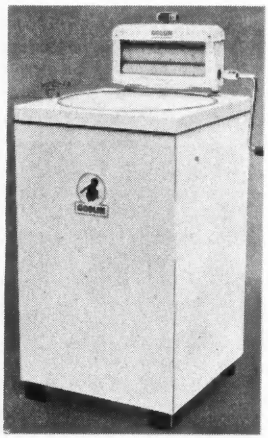
Specially designed to occupy minimum floor space (17⅜in square) and provide maximum washing capacity, the "Goblin" model W114 washing machine brought out by the BRITISH VACUUM CLEANER & ENGINEERING CO., LTD., Goblin Works, Leatherhead, is light and mobile, yet robustly constructed. The fabricated aluminium tub takes 4 lb of dry laundry and the detachable hand wringer has 10in rollers adjustable for pressure and taking the largest articles. The four-blade diecast aluminium agitator is driven by a ½ h.p. motor. The price is 25 gns (plus £7 13s 3d purchase tax in the United Kingdom).

Dishwasher

Power generated by the operation of boiling water is employed to work the "Sterilator" dishwashing machine developed by C.S.A. INDUSTRIES, LTD., Avon Works, Wharf Street, Warwick. An electric heating element (the original models are loaded at 6 kW but probably this figure will be reduced) raises 15 pints of water in the base from cold to boiling point in about 20 minutes. This boiling water passes up a central column which is thereby rotated at 500 r.p.m., the water being forced up through perforations in the column to impinge on the crockery arranged in a rubber covered wire rack



"Sterilator" dishwasher



"Goblin" model W114 washing machine

around it. The procedure can be repeated for rinsing. It is intended to fit the final models with time switches to render operation fully automatic. Strainers are incorporated at the bottom.

The machine, which measures 2ft 2in square by 3ft high, is of sufficient capacity to meet the washing-up needs of five persons.

Power Stand Wringer

An electrically operated wringer made by ACME WRINGERS, LTD., David Street, Bridgeton, Glasgow, is mounted on a stand with a four-position head and automatic drain enabling it to be used with sink, tub, boiler, washing machine or between washing and rinsing tubs. There is a 36in clearance between the floor level and the underneath of the apparatus. Twin safety release rails provide instantaneous release of pressure which is adjustable and indicated by the position of the control knob. The apparatus, which is finished in white enamel, is sold at £19 12s (plus £7 3s 4d purchase tax in the United Kingdom).

Opportunities in the Caribbean

United Kingdom Trade Mission's Report

THE prospects for British trade and the opportunities for expansion are surveyed in the report of the United Kingdom Trade Mission to Venezuela, Colombia, the Dominican Republic, Cuba and Mexico (H.M. Stationery Office, price 4s 6d). The report says that the United Kingdom's share of the imports of these five countries is declining and in 1952 amounted to only 4 per cent of the total. The Mission's object was to explore the methods by which the United Kingdom could increase its hard currency earnings by satisfying the needs of these rapidly developing markets.

The broad picture with which the Mission returned to the United Kingdom is that these countries are at present extremely prosperous and are engaged in intensive development of their natural resources and the building up of domestic industry. The proportion of imports of capital equipment and of plant and machinery is increasing rapidly and delivery dates are of great importance. The countries would prefer, if necessary, to pay somewhat high prices to secure early delivery.

Need for Engineering Consultants

Capital development projects include railways, roads, power stations, docks, water supply, airfields and many other undertakings. The Mission considers that if the United Kingdom is to take part in these schemes consulting engineers should be put in a position to be pioneers in developments which are under consideration, particularly in Venezuela and Colombia. There is little likelihood of British consulting engineers being invited to participate in any project unless they are established in Colombia and Venezuela, and the Mission is therefore discussing this question with the Government and the Association of Consulting Engineers.

Local industry is being developed with varying degrees of rapidity. The process has gone furthest in Mexico, but is also very marked in Venezuela and Colombia. The effect of this policy is likely to be that the market for imports of consumer goods will tend to dwindle. The Mission is of the opinion that in selected areas there would be a definite advantage to the United Kingdom if British manufacturers took a hand in this industrial development by manufacturing locally, with the object of creating an " invisible export " and replacing the declining market for consumer goods.

Value of Visits

The Mission believes, however, that United Kingdom exports can be increased very considerably, but the goodwill towards the United Kingdom in the countries visited will only be capitalized if there is a rapid follow-up of the Mission's visit. This will require a combined effort on the part of the Government and industry and commerce. Stress is laid on the importance of personal knowledge of and contact with the markets under discussion. To many of the younger generation of business men and industrialists in these countries the achievements, techniques and products of United Kingdom industry and commerce are little known, and this lack of knowledge will only be overcome if frequent visits are made by principals of firms and by qualified technicians and salesmen.

The report includes chapters giving the Mission's general observations on conditions in each of the countries visited. Among its recommendations, those affecting engineering include the following:—

Maximum efforts should be made to quote the earliest possible firm delivery dates for both short-term and long-term capital goods. Stocks should be maintained of standard types of short-term capital goods, and if required, some degree of financial assistance should be given to the stockists by manufacturers. As soon as practicable, firm prices should be quoted for both short-term and long-term capital goods and in the interim a limit should be placed on " escalator " clauses.

Encouragement should be given to

technicians to accept appointments as members of the staff of Government Departments and other organizations. The recommendations of the report of the British Engineering Training Mission to Latin America should be actively pursued, and every possible means of increasing the number of students should be sought. A selected number of responsible officials and business men should be invited to visit specialized trade exhibitions as the guests of the industry.

The formation of a local committee, responsible to the British Standards Institution, to advise the Venezuelan Standards Institution (the setting up of which is under consideration) should be kept in view. In the present lack of any Venezuelan standards, those of the United States are almost invariably used.

Engineers-in-Charge

THE forty-eighth annual dinner of the Institution of Engineers-in-Charge was held on 15th May with Sir William A. Stanier (president) in the chair. Proposing the toast of "The Institution," Sir Harold Roxbee Cox (chief scientist, Ministry of Fuel and Power) referred to the menace of industrial complacency. Improved engineering products and improved production of things made before, he said, were not enough. Customers wanted new things—gas turbines, for example, which were better than medium-sized turbines. The country's position could be maintained in this way with the aid of self-generated initiative and competitive stimulus.

Responding, the President expressed his belief that a mechanic willing to undergo the requisite training should be able, if qualified, to achieve the highest professional standing. The human side was as important as the technical and this aspect was fostered by the Institution in providing a forum for the reading of papers and mind-broadening discussions. The gas turbine for which 40 per cent thermal efficiency was to be expected (compared with 36 to 38 per cent for the diesel) was assured of a big future in the generation of electricity, which could be so easily transmitted. While fundamental research in this country was first-class, there were too few applied research workers, especially those qualified for design work. Comparisons with the U.S.A. often failed to take into account the value of their large home market; Britain's future depended on improved quality. National service was a handicap, but had not prevented Switzerland, where it had been in force for generations, from achieving a leading position with hydro-electricity and a desire to work as almost its only national assets, most of its raw material having to be imported. Enthusiasm for one's job, such as that displayed by the Council of the Institution and its secretaries, Messrs. A. E. Penn and A. T. Penn, was essential for progress.

The toast of "Our Guests and Friends" was proposed by Mr. Robert Chalmers (immediate past-president, Institution of Engineers-in-Charge) who referred to their eminence in every phase of engineering as furnishing examples of knowledge and the art of applying it, in which Britain led the world. In reply Dr. S. Livingstone Smith (British Shipbuilding Research Association) said that while it was the duty of engineers to do their best in any political situation, most of the problems would never have arisen had the engineer's practical approach to them been more widely spread.

Mr. F. E. Shaw (chairman, Institution of Engineers-in-Charge) proposed the health of the president with a citation of his distinctions, to which Sir William briefly replied, saying that the main thing about a job of work was to enjoy it. He also thanked the entertainers for their contribution to the success of the function.

Convention Golf

AMONG the principal social features of the British Electrical Power Convention (Torquay, 8th–12th June) are the golf competitions which are to be held on Wednesday, 10th June. The men's competition, at the Churston Golf Course, is for the G. P. Dennis Trophy, the winner being selected from the cards put in at any time during the day. There will be a prize for the runner-up. The entrance fee is 10s 6d and there will be no green fee or sweepstake.

The ladies' competition (at the Torquay Golf Course) is for the Lady Citrine Trophy and is being organized by Mrs. E. B. Sawyer.

The competitions are open to all bona fide members of the electrical industry attending the Convention and their ladies, whether delegates or not. All proceeds from entrance fees will go to the Electrical Industries Benevolent Association.

Further information is obtainable before the Convention from Mr. W. J. Bird (hon. secretary), Magnet House, Kingsway, London, W.C.2, or, during the Convention, from the Imperial Hotel, Torquay.

ELECTRICITY SUPPLY

Eastern Board's Revised Tariffs

Generation Statistics for April

THE Eastern Electricity Board announces that savings made by greater efficiency have been completely swallowed up by the recently announced rise in coal costs, and the Board is therefore compelled to increase its charges. Domestic tariff fixed charges and the domestic portion of the farm two-part rates are to be raised by the equivalent of 3d a week. Consumers supplied on the combined domestic and commercial tariff will generally pay more as the structure of the tariff has been altered to bring it into line with the farm two-part tariff, but for the smallest users of electricity in combined premises who do not want to pay a fixed charge there is a block rate allowing the first 104 kWh in any quarter at 6d and thereafter at 1½d. Consumers supplied on the industrial, commercial and farm block tariffs will not have to pay any more and the small users will in fact have a reduction in their charges. Consumers supplied on the industrial and commercial maximum demand tariff automatically pay for coal increases and a reduction in charges will be made to consumers on this tariff metered at high voltage by an adjustment of unit charges and coal clause.

Industrial Supply Terms

Last year the Eastern Electricity Consultative Council was approached by Enfield Rolling Mills, Ltd., regarding a proposed increase in the price of electricity to the company's factory. This was one of the first cases in which a large industrial consumer had sought the assistance of a Consultative Council. The company complained that its stand-by generating station, which it had built in 1947 at a cost of £100,000 to relieve the grid completely during peak hours, could not profitably be operated under the terms of the new tariff offered by the Board and would have to be scrapped. The Board did not agree with this contention, nor with the claim that the new terms involved an increase of the order of 40 per cent. After a number of meetings of the Tariffs Sub-Committee, at one of which counsel presented the company's case, a report containing a number of recommendations was sent to the Board. In a letter of 6th May the Board stated that it had been able to accept the principle of many of the representations. It agreed to reduce the annual maximum demand charge to £4 1s/kVA; to introduce two further steps in the "unit" charge; and to make the coal price adjustment clause 0·00077d (instead of 0·0008d) for each penny variation in the fuel cost per ton (a similar reduction is to be offered to other consumers taking supplies at high voltage). The Board further proposed to base the clause on a coal price of 65s a ton instead of 38s, in advance of any action which the Central Authority might take with regard to the bulk supply tariff. In view of load conditions it was unable to alter the hours during which reduced m.d. charges applied.

The Consultative Council has also had under consideration representations from Associated Portland Cement Manufacturers, Ltd., and in this case also the Board has accepted a number of its recommendations.

Power Station Open to Visitors

Since the recent "house warming" at the new Brighton "B" power station at Southwick over 3,000 members of the public have taken advantage of the opportunity to be shown round. The facility has proved so popular that it has been decided to open the new station to the public without admission tickets every Wednesday until the end of September next from 2 p.m. to 6 p.m. Visitors have been particularly interested in seeing No. 3 set in course of installation.

Maintenance Contract

Southend Corporation has been asked by the Eastern Electricity Board for an increase of 32 per cent over the 1950 figures for the renewal of the contract for repairing and maintaining electrical equipment in council houses. In consequence the Housing Committee has decided to place work with the Board on a time-and-materials basis.

Choice of Service

At a meeting of Ludlow Rural District Council it was reported that the Midlands Electricity Board would withdraw its request for a contribution of £100 for services to the 22 houses to be built at Craven Arms if the Council would give the tenants the choice of gas or electric

equipment. The matter of the type of cooker had previously been referred back to the Housing Committee with instructions to "fight" the request. Mr. E. Shaw, the engineer, reported that the West Midlands Gas Board was willing to compete with the M.E.B. on the site in this case and the Council agreed to the Electricity Board's request.

Rural Plans

Expenditure by the Eastern Electricity Board on rural development during the current financial year is expected to amount to £650,000, an increase of £250,000 on the sum set aside for the purpose last year. The Board points out that because of the high cost of supplying isolated consumers and the need to maintain a fair balance between the amounts paid by the new users and those borne by existing consumers it has reviewed the line rental scheme, changes in which are now being considered by the Consultative Council.

Cooker Suggestion Rejected

Barnard Castle R.D.C. has turned down a suggestion by the North Eastern Electricity Board that the Council should purchase electric cookers from the Board and sell them on hire purchase to Council house tenants. Although it was agreed that the scheme would be of great benefit to tenants, it was decided it was not the Council's duty to act as agents for the Board.

Street Lighting Improvements

WALTHAMSTOW Corporation proposes to seek sanction to borrow £18,000 for new lighting in Chingford Road and Forest Road, and for the improvement of the lighting in Hoe Street.

NEWPORT (Mon.) Corporation is recommended to seek sanction to borrow £5,015 for the provision of street lighting on various new housing estates.

SOUTH SHIELDS Town Council has asked the Ministry of Transport to approve a £4,356 street lighting scheme in Mowbray Road from Westoe Road to the Coast Road.

PLYMOUTH Street Lighting Committee has approved plans for relighting Houndiscombe Road from Mutley Plain to North Road Station and improving the lighting of Pennycomequick Hill. High-pressure mercury vapour lamps will be used in both cases.

HORNSEY (Middlesex) Borough Council is to use sodium vapour lamps for lighting all side streets.

House Installations

Ilford Housing Committee has agreed to spend £1,474 on installing immersion heaters in 129 flats and houses, so as to reduce by £3,536 the contribution required by the London Electricity Board for capital expenditure on providing electricity supplies. The matter is to be raised with the Association of Municipal Corporations.

Supply Extension

Durham R.D.C. has approved plans for a 20 kV overhead line to supply electricity to 146 houses at Bearpark.

Dust Nuisance

The British Electricity Authority is to overhaul the precipitators at Dunston-on-Tyne power station following complaints about dust settling on property in the west end of Newcastle-on-Tyne.

Generation in April

A 10 per cent increase in electricity generated by the British Electricity Authority and the North of Scotland Hydro-Electric Board is shown in the Ministry of Fuel and Power's monthly statement, details of which are tabulated below. At the end of April the total capacity of plant installed was 17,709 MW, a decrease of 79 MW compared with March. During the month two additional boilers were installed in B.E.A. stations—a 405,000 lb/hr Babcock & Wilcox unit at Barking "C" and a 300,000 lb/hr International Combustion unit at Skelton Grange.

ELECTRICITY GENERATED AND PLANT INSTALLED

	Fuel consumed Thousand tons			kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Coke and Breeze	Oil	Steam	Water power	Total*		
British Electricity Authority ..	2,814	73	3·3	5,147	16	5,171	4,861	17,15
North of Scotland Board ..	25	—	1·2	33	61	98	97	55
Total for April, 1953	2,839	73	4·5	5,180	77	5,269	4,958	17,70
Corresponding total for April, 1952	2,645	66	4·9	4,677	87	4,775	4,496	16,46
Increase or decrease, per cent ..	+7·3	+10·6	−8·2	+10·8	−11·5	+10·3	+10·3	+7·
Total to date (4 months) ..	12,966	344	30·1	23,229	383	23,672	22,304	
Total for corresponding months of 1952	12,451	287	26·7	21,767	529	22,355	21,096	
Increase or decrease, per cent ..	+4·1	+19·9	+12·7	+6·7	−27·6	+5·9	+5·7	

* The total figure includes 7·6 million kWh generated by oil engines and 4·6 million by waste heat plants in April, 19 3.

Rumanian Electrical Industry

Production for Home and Export

By JOHN CARDEW

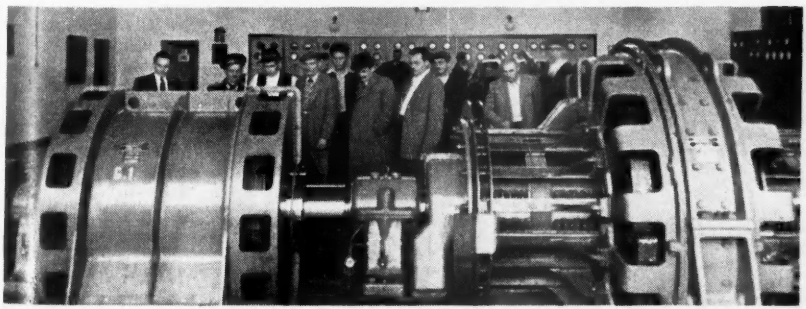
OF the new branches of the national economy established in Rumania since the end of the war none has made more rapid progress than the electro-technical industry. Although it was set up mainly to meet the country's own demands under a large-scale electrification programme, it has already developed in certain branches of production to a point where exports are possible.

Because of the tempo of its post-war industrialization Rumania provides an interesting example of the way in which even the Eastern European countries which were formerly the most backward have begun to supplement the output of the Soviet Union itself and the other more industrially advanced Eastern States. At the same time, however, a study of the country's economy shows that Western capital and other goods are still wanted. This is especially so in the case of electrical equipment. In spite of Rumania's own growing production and considerable imports from the Soviet Union, Czechoslovakia and Hungary, supplies from Western Europe are still being sought.

Meanwhile the new Rumanian electrical industry is progressing rapidly under the stimulus provided by a ten-year electrification programme started in 1951. One of the major projects now under way in Eastern Europe, the programme is intended to increase the country's power capacity to 2,600 MW by the end of 1960, compared with 740 MW in 1950. Consequently under the current Five-Year Plan governing the entire Rumanian economy electrical equipment is considered next in importance in the machine building industry to oil equipment and machine tools.

Until very recent times Rumania had virtually no electro-technical industry. German manufacturers supplied practically all the country's needs and the production of a limited number of small privately owned factories never assumed any great importance. One of the earliest enterprises established was a telephone works in Timisoara, now a big industrial centre near the western frontier with Yugoslavia and the leading town of the Banat. The factory was started during the 1914–18 war and a few years later moved to the capital, Bucharest, where it merged with the American Standard Telephone Company which assembled parts imported from Belgium. Together with other key indus-

Rumanian electrical plant at the "Carbochim" electrical factory



tries in the country the Bucharest plant was nationalized in 1948 and now exists as " Electromagnetica."

Under two short-term economic plans in 1949 and 1950 special attention was paid to the electrical industry which was then described as lagging behind other sections of industry. The big " Dynamo " factory in Bucharest was expanded for the production of electric motors and in addition to extensions to a number of other existing plants new factories were built, including one to make electric meters.

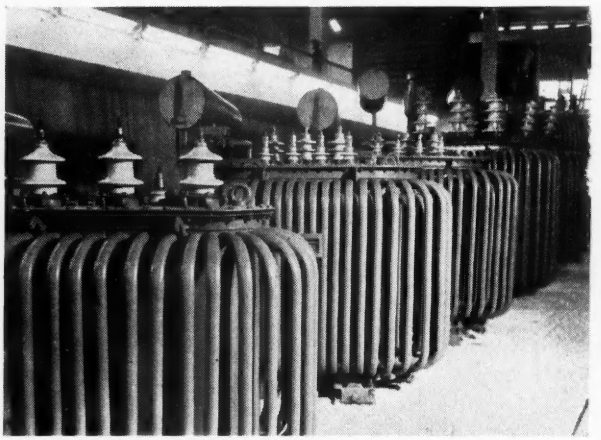
It was, however, the launching of the present Five-Year Plan that marked the real beginning of a long-term programme to render Rumania capable of producing the major machines and equipment for its electrification scheme. One of the first undertakings was the building of a factory at Resita to make steam and hydraulic turbines and generators. It functions within the framework of " Sovrommetal," one of the joint Soviet-Rumanian concerns, and began production in 1951 on the basis of plans supplied by the Soviet Union. Other Five-Year Plan projects include the extension of the " Vulcan " works in Bucharest to produce steam boilers for new power stations; the establishment of the " Electro-Putere " plant at Craiova for transformers, high-voltage apparatus and rotary machines ranging from 50 to 2,000 kW; the construction of a Bucharest factory for low-voltage equipment; and the setting up of a plant (to supplement two existing ones) for insulated and non-insulated conductors.

Old electric motor factories being enlarged to meet all Rumanian demands are " Electro-Precizia " at Satu-Lung for asynchronous and fractional h.p. motors, " Electro-Motorul " at Timisoara for asynchronous motors and the " Dynamo " plant in Bucharest for large and special motors, d.c. machines and generators for rural electrification. Two other new plants are to be set up on plans being supplied by the Soviet Union. One is for electrical insulation materials, and in addition to the draft plan for the factory the Soviet Union will instruct Rumanian technicians in the manufacturing processes. The second plant is to make electro-ceramic materials. Steel alloys and sheet steel for transformers and generators are to be developed in the course of the plan by the iron and steel industry.

By the end of the plan overall production in the electro-technical industry is expected to be nearly four times that in 1950 and sufficient to meet most of the country's requirements of electrical equipment as well as electrical consumer goods. The output of motors in 1955 is scheduled to reach 433,000 kW, or five times the 1950 output, and that of transformers 850,000 kW, or more than three and a half times the 1950 figure. Other target figures are: Generators, 184,000 kW; insulated electric cables, 3,300 tons; radio sets, 100,000. Altogether more than 70 new products not previously made in Rumania are to go into production in the course of the five years. These include turbo-generators, high-voltage apparatus, large transformers, telephone exchanges, electric furnaces, electrical machine tools, equipment for trolley buses, and lifts.

A number of the new products are already being turned out and they are reported to have been prominent at an industrial exhibition held recently in Bucharest. Motors of 1,000 kW (3,000 r.p.m.) are

Transformers produced by Rumanian concerns



being supplied to the metallurgical industry, 100 kW motors (300 r.p.m.) are being made for the paper industry and in the cement industry Rumanian-made 500 kW motors are taking the place of former imports. Automatic switchgear for up to 35,000 V is in production and the first lifts were reported to have left a Bucharest factory late last year.

A number of new factories brought into operation in the course of last year had electrical installations of Rumanian make. Most notable of these was the "Carbochim" plant in the industrial centre of Cluj, in Transylvania. The factory, to produce graphite electrodes, was wholly designed in Rumania and completely equipped with Rumanian-made equipment. Electrically-driven compressors are being supplied from Rumanian factories to construction sites on the Danube-Black Sea canal. The first turbine of 3,000 kW capacity for use in the electrification programme was turned out last year. It was reported at the time that this was copied from Soviet and Hungarian machines.

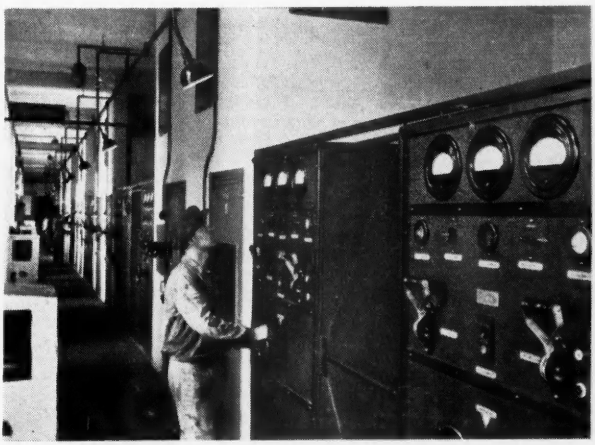
The industry's output of household electrical appliances has expanded considerably in recent years. The electrification of some 400 villages and the introduction of power to primitive areas like the Dobrudja, have led to an entirely new demand for lamps, heaters, electric irons and radio sets. The largest radio factory is the "Radio Popular" in Bucharest which produces three types of set—"Pioneer," "Baltica" and "Orion." The "Orion" 1952 type with three wavelength bands is the most modern in construction and design and is fitted with Russian valves. Loudspeakers are also an important product of the "Radio Popular" factory and so far more than 70,000 of these have been installed in peasant homes. A new Broadcasting House is at present under construction in Bucharest and a section opened last year was reported to have been fitted with equipment of Rumanian make.

An electro-technical research institute is being set up under the Five-Year Plan. The lack of skilled personnel was one of the problems that faced the industry in the early stages of its post-war development and a good deal of importance is still attached to the scope that major construction schemes like the Danube-Black Sea canal and the big hydro-electric project in north-east Rumania provide for training technicians. Before the launching of the electrification programme 200 Rumanian technicians, engineers and operatives spent periods in Soviet Union factories.

For some years now Eastern Europe, particularly Czechoslovakia, has been supplying limited quantities of manufactured goods, including electrical equipment, to a number of countries in the Middle East, Latin America and the overseas sterling area. Rumania has shared in this trade but it is only recently that the country has been able to offer electrical equipment.

So far, however, there has been little if any narrowing of the list of electrical imports that the Rumanians require. The list in fact is the longest of any distributed by State importing concerns in Rumania. It includes motors and generators, transformers, converting plant, rectifiers, distribution control and protective equipment, meters, traction equipment, radio-telephone installations, cables, insulators and insulating materials.

Switchboard at the "Berea" factory for processing methane gas



Financial Section

STOCKS and SHARES

THE contrast between the firmness of gilt-edged stocks and the weak tendency among industrial shares has become more marked. Some of the recent news from industrial companies has been disappointing, and the matter of engineering wages has introduced into the trading outlook another uncertainty making for safety-first tactics on the part of investment. Electrical equipment shares have been generally affected, with A.E.I. and Reyrolle both half-a-crown down on the week, and losses of 1s or more on, among others, Chloride Electrical, Decca, English Electric, Ever Ready, Lucas, Lancashire Dynamo and Parsons.

J. & P. New Shares

Shareholders in Johnson & Phillips have until 1st June to accept the offer of one new share at a price of 30s for every four old shares held and also to apply for "excess" shares; that is to say, for any which may not be subscribed in the way of rights. This latter opportunity is well worth noting; there is a premium of over £1 on the new shares, so that even a small allotment (which is the most that applicants can reasonably expect) would be of material value. Allotments may be renounced for a period of one month after acceptance, which means that shares will be available for ordinary investment purposes free of transfer stamp until the end of June. At the all-in price of a little over 50s, the indicated yield is nearly 6 per cent.

Cable Prospects

With the offer of new shares, Johnson & Phillips notified shareholders of the expectation that it should be possible to maintain the ordinary dividend, on the larger capital, at the regular rate of 15 per cent. Dealing in more detail with the outlook at last week's meeting, the chairman reported that business in the first quarter of 1953 had been excellent, and that the order book remained well filled. Intensification of competition is mentioned, and the same point is made in the annual report now issued by Aberdare Cables (Holdings). Here also, however, is a good account of present trading and of the further outlook.

Results for 1952

Now that most of the companies which closed their financial years at or about the end of 1952 have published their annual dividends and accounts, it becomes possible to take a fairly comprehensive view of company experience during a period which witnessed a marked change in trading conditions. In the following table the latest net earnings of a range of electrical and engineering firms are shown as a percentage (gross) on the ordinary capital. A comparison is made with the corresponding figures for the previous period and with the rates of dividends paid this year.

Earnings and Dividends

Adjustments are made in this table for the effect of capital bonuses, but not for the issues of shares for cash:—

Company	Earnings Per Cent 1951	Earnings Per Cent 1952	Latest Dividend Per Cent
A.E.I.	112	86	20
Babcock & Wilcox ..	99	68	18
Brook Motors	93	105	20
Chloride Electrical ..	103	55	20
English Electric	57	53	15
Ever Ready	66	60	35
Hoover	77	46	25
International Combustion	58	44	15
Johnson & Phillips ..	52	34	15
Laurence, Scott	72	80	15
C. A. Parsons	167	128	12½
Reyrolle	72	71	12½
Switchgear & Cowans ..	44	24	22½
Taylor Tunnicliff ..	95	94	25
Vickers	37	39	15
Watford Electric ..	45	45	25
Westinghouse	49	67	15

Effect of Taxation

For the fact that many of the 1952 earnings figures in the above table come out lower than before, or not greatly changed, the incidence of taxation must be held largely responsible. In the cases, for instance, of Reyrolle, Switchgear & Cowans, International Combustion and Watford Electric, the latest trading profits were all much higher than in 1951. Taxation (with the excess profits levy prominent) prevented any material increase, or at the worst a sizable reduction, in the net surplus available for ordinary dividends and reserves.

Excess Profits Levy

The majority of the figures for electrical engineering company earnings in 1952 would look a great deal better in the absence of E.P.L., which, of course, will cease to operate

after his year. Of those included in the foregoing list, A.E.I., English Electric and C. A. Parsons were particularly severely penalized by the levy, and the earnings per cent on ordinary capital of the first two were affected also by the enlargement of the capital now ranking for dividends as a result of share issues for cash. Most of the dividends, it will be noted, remain very comfortably within the rate of earnings available to cover them.

Company	Dividend Pre-vious	Dividend Last	Middle Price 18th May 1953	Week's Rise or Fall	Est. Yield p.c. £	s	d
Gilt-edged and Overseas Stocks							
Brit. Elec. 1968/73	3	3	88	—	3	8	2
Brit. Elec. 1974/77	3	3	86½	—	3	9	4
Brit. Elec. 1976/79	3½	3½	91½	—	6	16	6
Brit. Elec. 1974/79	4½	4½	100½	—	4	4	6
Calcutta Elec. ..	6†	6†	20/6	—	5	17	0†
East African Power	7	7	22/-	—	6	7	3
Nigerian Elec. ..	10	10	22/6	—	8	18	0
Palestine Elec. "A"	5†	Nil	13/6	—		—	
Perak Hydro-Elec.	Nil	Nil	15/-	—		Nil	
Equipment and Manufacturing							
AberdareCables(5/-)	20	25	16/-	—	7	16	4
Aerialite (1/-) ..	83⅓	88⅓	8/3	—1/-	10	14	0
Allen, W. H. ..	15	15	46/3	—		—	
Aron Elec. Ord. ..	15	15	38/9	—	7	14	10
Assoc. Elec. Ord. ..	20	20	77/6	—¼	5	3	3
Automatic Tel. & El.	15	15	58/9	—	5	2	3
Babcock & Wilcox	18	18	61/3	—2/9	5	17	5
Baldwin, H. J.(2/-)	25	20	3/9	—3d	10	13	4
Bakelite (10/-) ..	—	12½	17/-	—	7	7	0
British Aluminium	12	12	38/-	—1/-	6	6	4
B.I. Callender's ..	9	10	35/6	—6d	5	12	8
British Thermostat (5/-)	30	35	31/3	—	4	16	0
British Vac. Cleaner (5/-)	25	25	12/9	—1/-	9	16	2
Brook Motors (10/-)	20	20	32/6	—⅛	6	3	1
Brush Ord. (5/-) ..	10	4	3/9	—		—	
A. F. Bulgin (1/-)..	30	30	2/9	—	10	18	0
Burco (5/-) ..	38⅓	35	17/6	—	10	0	0
Chloride El. Storage	15	20	68/-	—1/-	5	17	9
Cole, E. K. (5/-) ..	25	25*	17/-	—		—	
Cossor, A. C. (5/-)..	Nil	10	8/3	—⅛	6	1	3
Crabtree (10/-) ..	17½	17½	31/-	—	5	13	0
Crompton Parkinson Ord. (5/-) ..	11¼	11¼	9/-	—9d	6	5	0
De La Rue (5/-) ..	50	35*	7/-	—6d		—	
Decca (5/-) ..	112½	150	24/-	—1/6	6	5	0*
Dewhurst (2/-) ..	22½	19*	5/6	—	6	18	3
Dictograph Tel. (2/-)	20	20	6/6	—	6	3	0
E.M.I. (10/-) ..	12	12	13/-	—3d	9	8	8
Electrical Components (5/-) ..	20	20	10/-	—	10	0	0
Elec. Construction	15	15	53/9	—¼	5	11	6
Enfield Cable Ord.	7½	5	20/6	—1/-	4	17	6
English Electric ..	15	15	56/6	—1/6	5	6	2
Ericsson Tel. (5/-)	22†	22*†	37/6	—1/6	2	18	9†
Ever Ready (5/-)	35	35	26/-	—1/6	6	14	8
Falk Stadelmann..	15	15	42/-	—3d	7	2	9
G.E.C. Ord. ..	22½	22½	40/9	—6d	5	10	5*
General Cables (5/-)	30	30	15/9	—6d	9	10	6
Greenwood & Batley	15	15	40/-	—	7	10	0
Hackbridge Cable (5/-)	20	20	12/-	—	8	6	8
Hackbridge Hewittic (5/-)	18	20	17/-	—	5	17	8
Hall Tel. Acc. (10/-)	10	10	11/3	—	8	17	10
Heatrae (2/-) ..	12½	12½	4/-	—	6	5	0
Henleys (10/-) ..	20	10½*	17/-	—1/-	6	3	6
Holophane (5/-) ..	15	20*	12/6	—	8	0	0
Hoover (5/-) ..	35	25	20/9	—1/-	6	0	6
Equipment and Manufacturing (continued)							
Intl. Combustion (5/-)	25	15*	13/3	—1/-	5	13	2
Johnson & Phillips	15	15	49/9	—	6	0	6
Lancashire Dynamo	12½	12½*	42/6	—⅛	5	17	9
Laurence, Scott (5/-)	15	15	14/3	—	5	5	3
London Elec. Wire	12½	12½	57/6	—⅛	4	7	0
J. Lucas	7½	9½	37/-	—1/9	4	19	0
Marryat & S. (2/-)	22½	22½	5/9	—	7	16	6
Mather & Platt ..	12½	15	47/6	—2/-	6	6	1
Metal Industries ..	10	15	41/6	—1/9		—	
Mid. Elec. Mfg. ..	15	15	60/9	—	4	18	9
Murex	12½	15	57/-	—1/9	5	5	3
Newman Ind. (2/-)	10	10	2/3	—	8	17	9
Oldham & Son (1/-)	30	35	2/6	—		—	
Parnall (Yate) (5/-)	6	6	2/10½	+1½d	10	8	8
Parsons, C. A. ..	10*	12½	65/-	—2/-	3	17	0
Plessey (5/-) ..	22½	25	23/6	—	5	6	3
Pye Deferred (5/-)	18	18	17/6	—⅛	5	2	9
Revo (10/-) ..	27½	27½	46/-	—	5	19	7
Reyrolle	10*	12½	53/9	—¼	4	13	0
Scot. Cable (4/-) ..	30	32	11/9	—1/-		—	
Siemens Ord. ..	10	10	35/-	—6d	5	14	3
Southern Areas ..	5	6	12/6	—	9	12	0
Strand Elec. (5/-)..	17½	17½	10/-	—	8	15	0
Sturtevant (5/-) ..	17½†	18·1*†	23/6	—3d	3	17	0†
Switchgear&Cowans (5/-)	22½	22½	14/9	—	7	12	7
Taylor T. (5/-) ..	20	25	20/-	—	6	5	0
T.C.C. (10/-) ..	20	20*	41/3	—	4	17	0
T.C. & M. ..	10	8½*	27/-	—1/-	6	6	0
Telephone Mfg.(5/-)	10	10	8/6	—3d	5	17	8
Thorn. Elec. (5/-)..	10	12½	10/9	—	5	16	4
Tube Investments	25	15*	55/6	—1/6	5	8	0
Vactric (5/-) ..	Nil	Nil	5/-	—		Nil	
Veritys (5/-) ..	7½	10	5/-	—	10	0	0
Walsall Conduits (4/-)	70	70	46/6	+6d		—	
Ward & Goldstone (5/-)	45	45*	35/-	—		—	
Watford (2/-) ..	25	25	6/6	—3d	7	13	10
Westinghouse Brake	14	15	53/3	—6d	5	12	9
West, Allen (5/-)..	15	15	12/3	—3d	6	2	6
Trusts, Transport and Communications							
Anglo-Am. Tel.: A Ord.	—	6	88½	—1	6	15	7
Ord.	—	3¾	57½	—	6	10	5
Anglo-Portuguese	8	8	21/-	—⅛	7	12	6
Brit. Elec. Traction: Def. Ord. ..	22½	25	520	—	4	15	9
Cable & Wireless: Ord.	8	8	137	+1	5	16	9
4% Loan ..	4	4	96	+1	4	3	4
Calcutta Trams ..	6†	6†	22/3	—	5	7	9†
Cape Elec. Trams..	5	5½	12/-	+6d	9	3	4
Marconi Marine ..	10	10	29/6	—6d	6	15	7
Oriental Tel. Ord.	16	16	68/9	+⅛		—	
Telephone Props..	8	8	95/-	—5/-		—	
Tele. Rentals (5/-)	10	10	8/-	—6d		—	

* After capital bonus. † Dividends are paid free of Income Tax.

REPORTS and DIVIDENDS

Johnson & Phillips, Ltd., held their annual meeting on 14th May when Mr. G. L. Wates (chairman and joint managing director), who presided, in referring to the development of aluminium-sheathed cable, said that the quantity installed to date was about 3,000 miles. In addition to public supply and other general applications, this product offered particular advantages in many large scale industrial schemes, and during the year under review they had completed some extensive contracts, including power stations, oil refineries and large steelworks installations. An important step forward in the consolidation of the position of aluminium as a reliable cable sheathing material was its prospective inclusion in the list of British Standards. It was expected that specifications would be issued before the end of the current year.

A new factory to manufacture paper insulated cables had recently been erected in Australia, and they had agreed to take a substantial investment in the company owning this factory. They were also taking a financial interest in a new company being formed to manufacture cables in Pakistan. In conjunction with the Telegraph Construction & Maintenance Co., Ltd., they had established in Scotland a small factory for the manufacture of a special plastic insulated cable. Referring to the provision of new capital, Mr. Wates said that the board was satisfied that the time had now arrived when a further £500,000 could be profitably employed in the business and provisionally allotment letters in respect of 333,437 ordinary shares issued at 30s each had been sent to ordinary shareholders with the report and accounts. Business done during the first three months of 1953 had been excellent, and their unexecuted order book, though less than at this time last year, was still of substantial dimensions. There were, however, obvious signs that the sellers' market was now at an end. There was again keen competition, both at home and abroad, and they had to fight for every order which they obtained.

Enfield Rolling Mills, Ltd.—The annual meeting was held on 13th May, the Earl of Verulam (chairman), presiding. In his circulated statement, the chairman said that during the summer of 1952, the higher bank rate, with its attendant problem of financing stocks of raw materials and work-in-progress; the rise in the price of copper from £227 per ton to £285 per ton; the weakness in the price of zinc; and the general slowing down of activity in many trades together combined to make customers cautious in placing their orders. The outcome was that, whereas they began the year with a full order book and achieved a high rate of production during the first six months, by the summer orders were much reduced and they were able to quote shorter delivery dates. Another matter which had an adverse effect upon the even flow of orders was the high rate of purchase tax, especially on certain household appliances. Although it was their expectation that profits in 1953 would be drastically reduced, they hoped to be able to maintain a reasonable dividend distribution.

The Ever Ready Co. (Great Britain) Ltd., is holding its annual meeting on 4th June. In his circulated statement Mr. E. N. Rowbotham (chairman) says that during the year under review difficulties regarding tariffs, import quotas, foreign exchange, etc., have resulted in some diminution of last year's record export turnover. They are expanding and reinforcing their overseas sales organization. Home sales also show a slight recession due mainly to the fact that with the change over from a sellers' to a buyers' market many of their customers reduced their stocks in the early part of the year. Reductions in the cost of many of their principal raw materials have enabled them to maintain their profits. Following upon the reduction of the prices of raw materials they reduced the prices of all radio batteries by 10 per cent in March last.

The Anglo-Portuguese Telephone Co., Ltd., proposes to create an additional 1,400,000 ordinary shares, bringing the total of unissued ordinary capital up to £1,550,000. Sir Alexander Roger (chairman), in his annual review, says that this is in readiness to issue in whole or in part at such times as the board may decide. The board has authorized the placing of orders for materials of substantial value and during 1953 it is proposed to carry out extensions to a number of exchanges and to develop and improve the service generally. Dealing with Portugal's six-year economic plan, Sir Alexander says that of the estimated cost of £168 millions, £30 millions has been allocated for the production and distribution of electricity. As the plan is gradually brought into operation it will be reflected in the additional demands on public services and in telephones. The waiting list for telephones at 31st December last was 22,020.

The British Oxygen Co., Ltd.—In the course of his speech at the annual meeting held on 15th May, Mr. J. S. Hutchison (chairman) said that they experienced an increase in sales during the year under review which was general in all departments. In their electric welding division, Quasi-Arc, Ltd., had a satisfactory year with greatly improved output and earnings resulting from better supplies of

materials which enabled the heavy arrears of orders to be cleared up. Development of the various forms of automatic or semi-automatic welding was proceeding satisfactorily under Fusarc, Ltd. They had a propitious year overseas in that the total of their profits from overseas sources increased materially and almost every unit contributed to the increase.

Blaw Knox, Ltd.—The annual meeting was held on 14th May, Sir Geoffrey Burton (chairman) presiding. In his circulated statement, the chairman said that new orders in all departments continued at a substantial level, although at a lower volume than for the previous year, and they carried forward £5 million of uncompleted business. The Tower Department had had a satisfactory year, and in addition to important contracts for high-voltage lines for the British Electricity Authority, they had during the year obtained orders for delivery to Uganda, Venezuela, New Zealand and India. In other departments, too, considerable orders had been received, although there was some falling off towards the end of the year.

Heatrae, Ltd., reports a net profit for the year to 28th February last, after deducting £11,500 for taxation, of £11,464, as compared with £15,737 for 1951-52. General reserve receives £5,000, and the dividend for the year is maintained at 12½ per cent. The balance carried forward is £23,769 (against £21,530 brought in).

Telephone Rentals, Ltd., reports a group profit for the year ended 31st December last, after meeting all charges, including £416,357 for taxation, of £239,264, as compared with £216,507 for 1951. The profit attributable to the holding company is £235,424. It is proposed to pay a final dividend of 6 per cent (same on smaller capital), making 10 per cent for the year (unchanged).

John I. Thornycroft & Co., Ltd., are to offer to ordinary shareholders 600,000 new £1 ordinary shares at par on the basis of one new share for each share held. Consent of the Capital Issues Committee has been received.

Mavor & Coulson, Ltd.—Particulars have been announced of a rights offer to ordinary shareholders. It is proposed to offer 244,892 new ordinary 10s shares at 25s each on the basis of one new share for every two held. The operation will provide a gross sum of £306,115.

New Companies

Phillips Control (G.B.), Ltd.—Registered 16th April. Capital £5,000. Electronic and electrical manufacturers, wholesale merchants and fitters, factors, maintainers and repairers of and dealers in electronic, electrical, medical, surgical and scientific apparatus, etc. Directors: J. E. Mossman, J. P. Harvey and Mrs. C. M. E. Harvey. Regd. office: 273, Farnborough Road, Farnborough, Hants.

C. G. Dobson & Partners, Ltd.—Registered 16th April. Capital £1,000. Electrical engineers, electrical installation contractors, etc. Directors: C. G. Dobson and Mrs. Ann Dobson. Regd. office: 33, Blackfriars Street, Manchester.

Woodrow Transformers, Ltd.—Registered 29th April. Capital £1,000. Manufacturers of and dealers in electric transformers, chokes, relays, coils, controls, switchgear, etc. Directors: E. J. Woodrow and Mrs. M. E. Woodrow. Regd. office: 45, Bloomsbury Square, W.C.1.

Inferation, Ltd.—Registered 23rd April. Capital £100. Electricians, electrical and radio engineers, mechanical engineers, manufacturers and dealers in electrical and radio apparatus, etc. Subscribers: W. E. Baldwin and Violet H. Baldwin. Secretary: Mrs. V. H. Baldwin. Regd. office: 11, Old Bond Street, W.1.

Weyco (Electrical), Ltd.—Registered 25th April. Capital £100. Electrical engineers and contractors, etc. Directors: L. Hobson and A. E. Dyall, directors of Weyco (Equipment), Ltd. Secretary: Arthur E. Dyall. Regd. office: Bevois House, 27-30, Basinghall Street, E.C.2.

William Haslam, Ltd.—Registered 25th April. Capital £1,000. Manufacturers, repairers and dealers in electrical, gas and oil lamps, quartz lamps, lamp standards, etc. Directors: R. L. Platts and W. Parker, a director of Irongate Lampshades, Ltd. Secretary: R. L. Platts. Regd. office: 22, Irongate, Derby.

Patterson Lamps (1953), Ltd.—Registered 6th May. Capital £25,000. Manufacturers, repairers and dealers in miners' safety lamps; electric, gas and oil lamps; quartz lamps, etc. Directors: T. A. Jones, A. Walker and J. Hutchinson. Secretary: John Hutchinson. Regd. office: Second Avenue, Team Valley Trading Estate, Gateshead on Tyne.

Oswald Davies (Electrical Supplies), Ltd.—Registered 2nd May. Capital £7,000. Manufacturers of and dealers in electrical plant and machinery, wireless and television sets, apparatus and components, etc. Directors: J. O. Davies and D. L. Walters. Regd. office: 25, Bridge Street, Carmarthen.

R. Dunn, Ltd.—Registered 30th April. Capital £2,500. To acquire the business of plumbers and electrical contractors, etc., carried on by R. Dunn and H. Dunn, as R. Dunn at 349, Ings Road, Sutton-on-Hull, Yorks. Directors: R. Dunn and H. Dunn. Regd. office: 349, Ings Road, Sutton-on-Hull, Yorks.

S.I. Engineering Co., Ltd.—Registered 18th March. Capital £10,000. Mechanical,

electrical, electronic, radio, marine, aeronautical and general engineers, etc. Directors : E. G. Tilley, Millicent T. Gissing and C. T. H. Gunter. Solicitors : Theodore Goddard & Co., 5, New Court, W.C.2.

Puro Fires, Ltd.—Registered 25th March. Capital £5,000. Electrical equipment specialists, etc. Directors : R. S. Prendergast and A. Watt. Secretary : R. S. Prendergast. Regd. office : 9, Sydenham Road, Guildford, Surrey.

Dowler Electric Motor Repair Co., Ltd.—Registered 20th April. Capital £1,500. To acquire the business of electrical repairers now carried on by C. Dowler and R. L. Dowler at 28, Danbury Street, Islington, as Radelec. Directors : H. A. Hull, R. C. Hull and C. Dowler. Regd. office : 28, Danbury Street, N.1.

Increases of Capital

Ferranti, Ltd.—Increased by £1,000,000, in £1 5½ per cent third cumulative preference shares, beyond the registered capital of £2,500,000.

L.P.S. Electrical Co., Ltd.—Increased by £275,000, in 240,000 "A" ordinary and 35,000 "B" ordinary shares of £1, beyond the registered capital of £25,000.

Small Electric Motors, Ltd.—Increased by £50,000, in £1 preferred ordinary shares, beyond the registered capital of £100,000.

H. J. Cash & Co., Ltd.—Increased by £15,000, in £1 ordinary shares, beyond the registered capital of £25,000.

Westinghouse Brake & Signal Co., Ltd.—Increased by £1,000,000, in £1 ordinary shares, beyond the registered capital of £1,500,000.

British Relay Wireless & Television, Ltd.—Increased by £474,900, in 1,199,600 "A" ordinary and 700,000 "B" ordinary shares of 5s each, beyond the registered capital of £100. 250,000 "B" ordinary shares are intended to be allotted as fully paid to Pye, Ltd., and Murphy Radio, Ltd., in consideration of the sale to the company of the whole of the issued share capital of Link Sound & Vision Services, Ltd. The company was converted into "public" on 25th March, 1953.

Meeting of Creditors

Mayfield Electrics, Ltd.—Meeting of creditors on 26th May at the offices of Rushton Osborne & Co., 11-12, Finsbury Square, London, E.C.2, for the purposes mentioned in section 297 of the Companies Act, 1948.

Liquidations

Davis's Radio, Ltd.—Winding up voluntarily. Liquidator, Mr. A. W. Hunter, Walter House, 418-422, Strand, London, W.C.2.

Castle Radios, Ltd.—Particulars of claims to the liquidator, Mr. T. C. Craig, 52, Athol Street, Douglas, by 30th May.

Bankruptcies

A. J. Digby, 238, Walworth Road, London, S.E.17, and 22f, Doughty Mews, W.C.1, electrical contractor.—First meeting 27th May and public examination 9th July, both at Bankruptcy Buildings, Carey Street, London, W.C.2.

L. G. Sharp, 4, Summerley's Road, Princes Risborough, Bucks, electrician.—Last day for receiving proofs for dividend 29th May. Trustee, Mr. J. H. Marshall, 55, North Street, Thame, Oxon.

H. Bullock, trading as H. Bullock & Sons at 17, High Street, Bromyard, Herefordshire, electrical engineer.—First meeting held 19th May. Public examination 16th June at the Shire Hall, Worcester.

G. W. Altass, 1, Bruce Avenue, Shepperton, electrical engineer and general contractor.—Trustee, Mr. J. W. Skelsey, 2-3, Norfolk Street, Strand, London, W.C.2, appointed 5th May.

D. L. Smith, residing at 9, Kensington Road, Coventry, and lately carrying on business at Midland Bank Chambers, Cefn Road, Old Colwyn, Denbighshire.—Last day for receiving proofs for dividend 29th May. Trustee, Mr. R. P. Booth, 5, Rumford Place, Liverpool, 3.

NEXT WEEK'S EVENTS

Monday, 25th May

ENFIELD.—George Hotel, 7.30 p.m. Purchasing Officers' Association, North London Group. Annual general meeting.

Tuesday, 26th May

LONDON.—Manson House, Portland Place, W.1, 6 p.m. Society of Instrument Technology, Ltd. Annual general meeting, followed by "The Instrumentation of Pilot and Experimental Scale Plant," by W. A. Goldstein.

Wednesday, 27th May, to Saturday, 30th May

BELFAST.—Balmoral Showgrounds. Royal Ulster Agricultural Show.

Wednesday, 27th May, to Saturday, 6th June

BIRMINGHAM.—Bingley Hall. Grocers', Bakers', Confectioners' and Caterers' Exhibition.

Thursday, 28th May

BIRMINGHAM.—The Birmingham Electric Club, 9 a.m. Annual outing. Visit to Glass Bulbs, Ltd., Harworth.

BRISTOL.—At Carwardines, Ltd., Baldwin Street, 7.15 p.m. Purchasing Officers' Association, West of England Branch. Annual general meeting.

SHEFFIELD.—Grand Hotel, 7.30 p.m. Incorporated Plant Engineers, South Yorkshire Branch. "New Developments in the Coal-mining Industry."

Friday, 29th May

BIRMINGHAM.—Imperial Hotel, 7.30 p.m. Incorporated Plant Engineers, Birmingham Branch. "Dust Control," by R. J. Pitt.

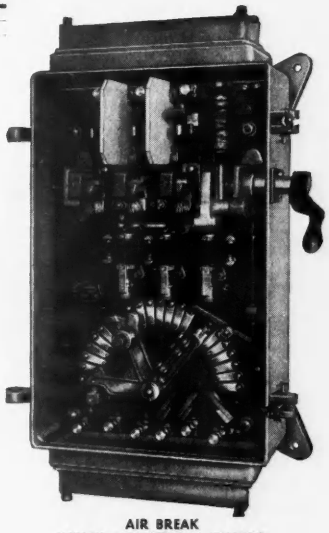
CONTROL

for

A.C. MOTORS

Air Break,
Oil Immersed

Available for early despatch for Squirrel Cage and Slip Ring Motors.



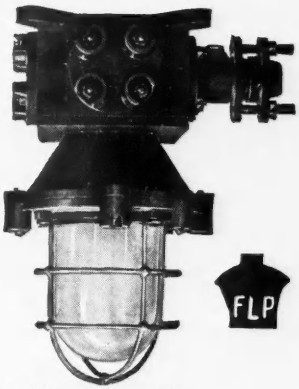
AIR BREAK
ROTOR AND STATOR STARTER

VERITYS LTD., Sales Headquarters :
BRETTENHAM HOUSE, LANCASTER PLACE, W.C.2
Works: **ASTON, BIRMINGHAM 6**

IMPROVED DESIGN

The "Wigan" flameproof well-glass fitting illustrated incorporates a new plug-in connection from the flameproof bush to the terminal block in the joint box.

The fitting is manufactured in 3 sizes, viz. 60, 100/150 and 200 watt, and has been certified by the Ministry of Fuel and Power, Safety in Mines Research and Testing Branch, Buxton.



HEYES *of Wigan*

LONDON : 21 Fitzroy Square, W.1.

BIRMINGHAM (Midland Agent) :
F. G. Ketelbey, M.I.E.E., Gazette Buildings, Corporation Street.

SOUTH AFRICAN AGENTS :
Messrs. Wilson & Herd Ltd., New Commercial Exchange Buildings (5th Floor), Harrison Street, Johannesburg. P.O. Box 3093.

HEYES & COMPANY LIMITED, WATER HEYES ELECTRICAL WORKS, WIGAN

dm HC 52

June 1st — another "see" day

Silverlight*

SINGLE COIL

★ *The lamp that is kind to the eyes*

40 watts
60 watts
} 1/6d + 3½d P.T.

100 watts
B.C. or E.S. 2/- + 4½d P.T.

200/260 volts.
(10 volt steps)

METROVICK
LAMPS

METROPOLITAN-VICKERS ELECTRICAL CO. LTD., ST. PAUL'S CORNER
1-3 ST. PAUL'S CHURCHYARD, LONDON, E.C.4. *Member of the A.E.I. group of companies.*

S/301

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 1st July from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1948

2002. Standard Telephones & Cables, Ltd., Brown, A., and Toulin, D. A.—Electrical switches. 21st January, 1949. (693481.)

19699. Boulton Paul Aircraft, Ltd., and Millard, D. J. —Electrically driven variable delivery hydraulic pump systems. 25th July, 1949. (693482.)

26640. Williams, F. C., and Kilburn, T.—Electronic digital computing apparatus. 4th October, 1949. (693424.)

1949

14961. Poor & Co.—Acid zinc electroplating and electrolyte therefor. 3rd June, 1949. (693557.)

15813. Poor & Co., and Acme Steel Co.—Acid zinc electrolyte method of electroplating. 14th June, 1949. (693558.)

20056. Power-Gas Corporation, Ltd., and Wright, G. —Electrical apparatus for controlling cyclic operation of multi-unit apparatus. 28th July, 1950. (693352.)

22982. Rely-a-Bell Burglar & Fire Alarm Co., Ltd.— Theft-prevention apparatus. 5th September, 1950. (693559.)

24822. Siemens & Halske Akt.-Ges.—Circuit arrangements for telephone installations employing selector or automatic operation, for signalling with a.c. in the voice frequency range. 27th September, 1949. (693613.)

32181. Smith & Sons (England), Ltd., S., and Furzehill Laboratories, Ltd.—Magnetic amplifiers. 20th October, 1950. (693617.)

1950

2207. Berger, J.—Electric counting apparatus. 27th January, 1950. (693563.)

3291. Farbenfabriken Bayer.—Capacitor. 8th February, 1950. (693620.)

3906. General Electric Co., Ltd., and Lambert, R. A. —Electrical timing devices. 12th January, 1951. (693621.)

5489. Siemens & Halske Akt.-Ges.—Sintered magnetic elements for rotary-magnet measuring instruments. 3rd March, 1950. (693627.)

5800. Sylvania Electric Products, Inc.—Electron discharge device. 7th March, 1950. (693567.)

11259. Electric & Musical Industries, Ltd.—Radio antenna arrangements. 7th May, 1951. (693435.)

12153. Standard Telephones & Cables, Ltd.—Electric pulse counting circuits using crystal triodes. 18th May, 1950. (693631.)

15775. Sangamo Weston, Ltd.—Electrical bridge measuring instruments employing ratiometers. 1st January, 1951. (693368.)

16035. Southern United Telephone Cables, Ltd.— Means for recording the readings of an instrument or group of instruments. 27th June, 1951. (693369.)

16698. General Electric Co., Ltd., and Thomas, E. R. —Exposure meters and apparatus for measuring brightness. 25th October, 1951. (693443.)

17580. Mek-Elek Engineering, Ltd., and Cooper, H. C. —Insulating guard plates for live electric terminals or contacts. 11th October, 1951. (693570.)

17916. Telegraph Construction & Maintenance Co., Ltd. Joints and joint covers for multiple conductor electric cables. 12th July, 1951. (693371.)

18755. Associated Electrical Industries, Ltd.—Correction of spherical aberration in electron lenses. 15th June 1951. (693444.)

21782. Metropolitan-Vickers Electrical Co., Ltd.— Electrical control systems for machinery, more particularly the flying shear control of metal coming from rolling mills. 19th April, 1951. (693447.)

22829. Eastman Kodak Co.—Electrical facsimile apparatus, more particularly for tape recording. 18th September, 1950. (693578.)

24733. British Electric Transformer Co., Ltd.— Electric power transformers. 9th October, 1951. (693448.)

24821. Firestone Tyre & Rubber Co., Ltd., and Collins, J. B.—Method of and means for measuring the width of electrically insulating material in sheet or web form. 18th September, 1951. (693583.)

26278. British Thomson-Houston Co., Ltd., and Stokes, J. A.—Remote position control systems. 25th September, 1951. (693506.)

26923. Siemens Electric Lamps & Supplies, Ltd.— Fluorescent materials. 26th October, 1951. Cognate application 31625, 29th December, 1950. (693638.)

27548. Reumerman, T., and Helmig, W. H. T.— Automatic telephone and like selecting systems. 18th August, 1948. Divided out of 693554. (693588.)

27974. Marconi's Wireless Telegraph Co., Ltd.— Variable inductances. 8th June, 1951. (693384.)

28226. Heenan & Froude, Ltd.—Electric remote control systems. 16th November, 1951. (693452.)

28395. Pye, Ltd.—Television cameras. 21st February, 1952. (693385.)

28427. British Thomson-Houston Co., Ltd., Snadow, R., Parriss, W. H., and Baker, B. S.—Process for the treatment of mica. 13th November, 1951. (693453.)

29256. Metropolitan-Vickers Electrical Co., Ltd.— Temperature change signal devices. 29th November, 1950. (693642.)

29359. Plessey Co., Ltd.—Metal coated ceramic elements. 30th November, 1951. (693455.)

30538. British Dielectric Research, Ltd.—Manufacture of electric capacitors. 13th December, 1951. (693513.)

31485. Philips Electrical Industries, Ltd.—Electric circuits for use with cathode-ray tubes and like purposes. 28th December, 1950. (693457.)

1951

827. British Thomson-Houston Co., Ltd.—High-speed textile-spinning machine spindles. 28th December, 1951. (693515.)

1850. Thorn Electrical Industries, Ltd.—Methods of phosphor application. 24th January, 1951. (693391.)

2681. Muirhead & Co., Ltd.—Checking and control arrangements for facsimile telegraph apparatus. 16th January, 1952. (693593.)

2893. Standard Telephones & Cables, Ltd.—Mounting arrangements for components of electrical circuits. 5th February, 1952. (693459.)

3532. Birmingham Sound Reproducers, Ltd., and Guest, L. V.—Sound reproducing apparatus. 8th February, 1952. (693594.)

4039. British Insulated Callender's Cables, Ltd.— Protective coverings for electric cables, pipes and the like. 18th February, 1952. (693460.)

4100. Cianchi, A. L. G.—Electrical condensers. 20th February, 1952. (693461.)

4814. Loblite, Ltd.—Electrical junction boxes. 25th February, 1952. (693462.)

5422/3. British Electrical & Allied Industries Research Association.—D.c. electric transmission systems employing valve convertors. 28th February, 1952. (693463/4.)

6657. General Electric Co., Ltd., and Puckette, jun., C. C.—Screw clamping means for connecting electrical conductors to terminals. 19th February, 1952. (693466.)

6822. General Electric Co., Ltd., and Cronin, D. E.—Aerial systems. 14th March, 1952. (693654.)

8992. Philips Electrical Industries, Ltd.—Electromagnetic devices for amplitude modulation of a high-frequency oscillation. 17th April, 1951. (693596.)

11692. Babcock & Wilcox, Ltd.—Tubulous steam generating and superheating units. 18th May, 1951. (693532.)

12459. Research Corporation.—Systems for energizing electrical precipitators. 28th May, 1951. (693404.)

12583. Metropolitan-Vickers Electrical Co., Ltd.—Casings for indicating instruments. 2nd April, 1952. (693533.)

14192. Allmanna Svenska Elektriska Aktiebolag.—Transductors with self-excitation. 15th June, 1951. (693663.)

15264. Metropolitan-Vickers Electrical Co., Ltd.—Insulation of electrical equipment. 27th June, 1951. (693471.)

15385. Edison Swan Electric Co., Ltd. (General Electric Co.).—Amplitude modulation circuits. 28th June, 1951. (693472.)

16087. British Thomson-Houston Co., Ltd.—Magnetic cores. 6th July, 1951. (693605.)

17037. Philips Electrical Industries, Ltd.—Circuits for changing the value of a direct voltage. 18th July, 1951. (693473.)

17284. Radio Corporation of America.—Electron discharge device in which an optical image is converted to an electrical signal. 20th July, 1951. (693667.)

17426. Soc. Alsacienne de Constructions Mecaniques.—Manufacture of electric cables. 23rd July, 1951. (693668.)

17674. General Radio Co.—Method of and apparatus for improving the contact stability of continuously adjustable electric transformers and the like. 25th July, 1951. (693406.)

18126. Hudson Bay Mining & Smelting Co., Ltd.—Electrodeposition of zinc from zinc sulphate solutions using a lead base alloy anode. 31st July, 1951. (693538.)

19348. Standard Telephones & Cables, Ltd.—Velocity modulation tubes. 16th August, 1951. (693671.)

19801. Edison Swan Electric Co., Ltd.—Manufacture of fluorescent screens. 22nd August, 1951. (693672.)

22183. Picker X-ray Corporation Waite Manufacturing Division, Inc.—Radiographic apparatus. 21st September, 1951. (693475.)

22340. Ek, F.—Device for blocking out-of-order elements in a telecommunication system. 24th September, 1951. (693542.)

22744. Poor & Co.—Compositions and methods for electroplating zinc. 28th September, 1951. (693607.)

23707. Berthold, R.—Magnetic instruments for measuring the thickness of thin films. 11th October, 1951. (693675.)

23708. Saba Schwarzwälder Apparatebau-Anstalt A. Schwer Söhne Ges.—Electric condensers. 11th October, 1951. (693676.)

24591. Winchester Electronics, Inc.—Electrical plug and socket connectors and locking devices therefor. 22nd October, 1951. (693414.)

26276. Philips Electrical Industries, Ltd.—Television camera tubes. 9th November, 1951. (693678.)

28521. British Thomson-Houston Co., Ltd.—Methods of and apparatus for coating hollow glassware. 5th December, 1951. (693416.)

1952

4889. British Thomson-Houston Co., Ltd.—Washing machines. 25th February, 1952. (693548.)

8117. Forges et Ateliers de Constructions Electriques de Jeumont.—Control systems for asynchronous electrical machines. 31st March, 1952. (693680.)

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 13th June.

ELECTRIC & MUSICAL INDUSTRIES, LTD. (design) No. B.713,754, Class 7. Electric drying machines, electric washing machines and electric ironing machines and parts (not included in other classes). ELECTRIC & MUSICAL INDUSTRIES, LTD. (design). No. B.713,755, Class 9. Electrical scientific instruments and apparatus, apparatus and instruments for recording, reproducing, receiving and transmitting sound, sound records, gramophone needles, television apparatus, electron discharge tubes, electric vacuum cleaning apparatus, electric dust extractors, electric flat irons, electric kitchen utensils included in Class 9, photographic and cinematographic apparatus, cinematographic films prepared for exhibition, and optical, weighing, measuring and signalling apparatus and instruments, and parts (not included in other classes) of all these goods. ELECTRIC & MUSICAL INDUSTRIES, LTD. (design). No. B.713,756, Class 11. Refrigerating machines and installations; electrical apparatus for heating, cooking, lighting, drying and ventilating; and parts (not included in other classes) of all these goods.—Electric & Musical Industries, Ltd., Blyth Road, Hayes, Middx.

LEWYT. No. 713,548, Class 9. Electric vacuum cleaners and parts included in Class 9.—Lewyt Corporation, Brooklyn, U.S.A. Address for service, c/o Stevens, Langner, Parry & Rollinson, 5–9, Quality Court, Chancery Lane, London, W.C.2.

PLAUBEL. No. 714,239, Class 9. Scientific, nautical, surveying and electrical apparatus and instruments included in Class 9; photographic, optical, weighing, signalling and measuring apparatus and instruments: galvanic batteries and electric accumulators.—Goetzschrader, trading as Plaubel Feinmechanik und Optik, Frankfurt Main, Germany. Address for service, c/o H. D. Fitzpatrick & Co., 94, Hope Street, Glasgow, C.2.

SILOHM. No. 714,381, Class 9. Electric resistances.—Société Le Carbone-Lorraine, Paris, France. Address for service, c/o D. Young & Co., 29, Southampton Buildings, Chancery Lane, London, W.C.2.

AERODYNE. No. B.715,499, Class 9. Electric suction cleaning machines and parts included in Class 9 of such machines.—Hoover, Ltd., Perivale, Greenford, Middx.

VIDA. No. 715,551, Class 9. Devices for use in measuring stress, strain or tension by electrical means.—Jones Stroud & Co., Ltd., Vida Mills, Long Eaton, Nottingham.

Oil Production and Refining

A REPORT of 262 pages by European experts who visited the United States in 1951 to study methods adopted in the oil industry there has been issued by the Organisation for European Economic Co-operation (2 Rue André-Pascal, Paris, 16e) under the title of "Oil Refining and Drilling in the U.S.A." The document deals with the most modern practice with reference to specific plants and is intended as a general guide to the subject as a basis for further improvements in European practice.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia. — MELBOURNE. — 8th June. City Council. Supply of v.i.r. cables, insulating materials and braided aerial cables. (C.R.E. 17080/53. Ten/6420.)*

Billericay.—6th June. U.D.C. Street lighting equipment. (See this issue.)

Bristol.—2nd June. City Council. Posts, beacons, flasher units, etc., for pedestrian crossing lighting. City engineer, Arno's Court, 470, Bath Road, Brislington.

Coventry.—19th June. City Council. Electrical contractors are invited to tender for work at the new Council offices. (See this issue.)

Formosa. — TAIPEI. — 11th June. Central Trust of China. Supply of one 60 h.p. and one 75 h.p. induction motors and two electric hoists. (C.R.E. 16238/53. Ten/6386.)*

Greece.—ATHENS.—30th May. Ministry of Communications. Broadcasting studio equipment and communications receivers. (C.R.E. 16818/53. Ten/6377.)*

Grimsby. — 3rd June. Borough Council. Electrical installations required in connection with the erection of an occupation centre at Second Avenue, Nunsthorpe. J. V. Oldfield, borough surveyor, Municipal Offices, Town Hall Square.

India.—NEW DELHI.—27th May. Director General of Supplies and Disposals. Electrically-driven pumping set and electric motor. (C.R.E. 16577/53. Ten/6381.)* 1st June. Train lighting lead-acid and alkaline cells. (C.R.E. 17088/53. Ten/6398.)* 4th June. Supply of 300 W medium frequency radio beacon transmitters and spare parts. (C.R.E. 17063/53. Ten/6388.)* 8th June. Train lighting lead-acid cells. (C.R.E. 16654/53. Ten/6372.)* 19th June. Supply of l.r.s. cable and cable terminal lugs. (C.R.E. 17062/53. Ten/6392.)* Insulating tapes. (C.R.E. 17064/53. Ten/6397.)*

MADRAS.—1st June. Madras Port Trust. Boiler tubes, condenser tubes and screened ferrules. (C.R.E. 16891/53. Ten/6379.)*

London.—16th June. India Store Department. Supply of 406 2 kVA transformers. (See this issue). 3rd July. Supply of electric cable. (See this issue.)

Maidenhead.—5th June. Borough Council. Street lighting equipment, Bath Road. Borough surveyor.

New Zealand.—DUNEDIN.—15th July. City Electricity Department. One 1,000 MVA 110 kV circuit breaker for Halfway Bush substation (Contract No. 476). (C.R.E. 17168/53. Ten/6403.)* Lightning arrestors for Halfway Bush substation (Contract No. 477). (C.R.E. 17167/53. Ten/6402.)*

Newbiggin (Northumberland).—4th June. U.D.C. Supply of nine 250 W and forty-eight 80 W m.v. lanterns and thirteen 60 W filament lamp lanterns. Surveyor, Council Offices.

South Africa.—KRUGERSDORP.—10th June. Town Council. Transformers, h.v. and l.v. cables and h.v. and l.v. switchgear. (C.R.E. 17359/53. Ten/6416.)*

JOHANNESBURG.—18th June. South African Railways. Supply of h.v. circuit breakers. (C.R.E. 17360/53. Ten/6413.)* 10th June. Lead-acid cells. (C.R.E. 16615/53. Ten/6376.)*

Tangier.—23rd June. Water and Electricity Board. Electrical equipment for a 5,500 V transformer station. (C.R.E. 16591/53. Ten/6423.)*

United States.—CENTRALIA (WASHINGTON). —9th June. City Council. Supply of a 10,000/12,500 kVA transformer. (C.R.E. 16745/53. Ten/6429.)*

Uruguay. — MONTEVIDEO. — 12th June. Administracion Nacional de Combustibles, Alcohol y Portland. Electrically driven pump for fuel oil. (C.R.E. 17073/53. Ten/6395.)*

25th June. Usinas Electricas y Telefonos del Estado. Distribution boxes and terminals. (C.R.E. 17077/53. Ten/6394.)*

Wrexham.—27th May. Borough Council. Electrical installations in 256 "Wates" houses and 28 traditional houses in southern area of Queen's Park Estate. Borough surveyor, 31, Chester Street.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Birmingham.—Factory; Rex Arnold, Ltd., The Factory Centre.

Blackpool.—Factory, Clifton Road, for Blackpool Rope & Twine Co., Ltd.; Gorst & Crabtree, architects, Blackpool.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Horse Guards Avenue, Whitehall, S.W.1 (Trafalgar 8855).

Cardiff.—Omnibus station in Wood Street (£46,320); city engineer, City Hall.

Caterham.—Library and flats, Mill House estate; U.D.C. surveyor.

Chadderton.—Branch library, South Ward; borough surveyor.

Chertsey. — Public library at Kingthorpe Gardens, Addlestone; surveyor, Urban Council Offices.

Cheshire.—Proposed new Mid-Cheshire Technical College, Hartford (commence 1954); county architect, Chester.

Chester. — Works, Sealand estate; Serck Radiators, Ltd., Park Royal Road, London, N.W.10.

Chinley.—Reconstruction of mill after fire for J. Lingard, Ltd.; Z. & W. Wade, Ltd., Whaley Bridge.

Clacton-on-Sea.—Maternity hospital accommodation, Skelmersdale Road; North East Metropolitan Regional Hospital Board, 3, Queen Anne Street, W.1.

Coulsdon and Purley.—Houses (42), Coulsdon and Sanderstead; H. M. Collins, U.D.C. surveyor, Council Offices, Purley.

Coventry. — Police headquarters at Little Park Street (£300,000, commence 1954); D. E. E. Gibson, city architect.

Hotel block, Broadgate; Ravenseft Properties, Ltd., 52, Charles Street, London, W.1.

Science block, Couldon Castle School (£19,000); city architect.

Reinstatement of premises after fire at Carlton Road for B. Laird & Co., Ltd.; Greenway & Dixon, Foleshill Road.

Croydon. — Houses (164), Palace Green, Addington; Addiscombe Garden Estates, Ltd., 15, George Street.

Devizes.—Out-patients' department at District Hospital; Snailum, Huggins & Le Fevre, architects, 18, Brock Street, Bath.

Durham. Flats (54), Sunderland Road estate; J. W. Green, city engineer, Town Hall.

East Grinstead.—New villas to form permanent accommodation for nurses at Queen Victoria Hospital (£130,000); South East Metropolitan Regional Hospital Board, 11, Portland Place, London, W.1.

Gateshead.—Eight-storey flats, Barn Close area (196 dwellings); chief architect, Municipal Buildings.

Secondary schools at Hillheads and Beacon Lough and infants' school at Leam Lane; chief architect, Municipal Buildings.

Hinckley.—Further 24 houses on Sketchley Hill estate; Council's architect, Hinckley, Leics.

Hull.—Works, Reform Street estate; White & Farrell, Ltd., 67/69, Beverley Road.

Dwellings (210), Grange Road; city architect.

Huyton-with-Roby. — Houses (250), St. John's Road East housing estate; chief architectural assistant, County Offices, Huyton.

Ilford.—Development of site on Marks Gate estate for houses; borough surveyor, Town Hall.

Ilkeston.—Houses (60), Kirk Hallam estate; borough engineer.

Kingston-on-Thames.—Flats (105), Chessington Hall estate; borough engineer.

Liverpool.—New shop and office building at Lord Street and Castle Street for Pearl Assurance Co., Ltd.; A. E. Shennan, architect, 17, North John Street.

Additional classrooms at Anfield Road, Birchfield Road, Kingsthorne Road, Sefton Park, Warbreck, Sudley Road, Tiber Street, and St. Michael's Primary Schools; city architect.

London.—Camberwell.—Flats (15), Gowlett Road and Redham Road; C. A. S. (Contractors), Ltd., 7, Drayton Gardens, S.W.10.

Lincoln's Inn Fields.—Nuffield College of Surgical Sciences; Young & Hall, architects, 9, Southampton Row, W.C.1.

Westminster.—Extensions to Coach Station; London Coastal Coaches, Ltd., Buckingham Palace Road, S.W.1.

Manchester.—Secondary school for boys at Plant Hill, Blackley; city architect.

Middlesbrough.—Houses (78), Park End area; borough engineer, Municipal Buildings.

Milnrow. — Houses (46), Bentgate estate; U.D.C. surveyor, Council Offices, Milnrow, Lancs.

Newport (Mon).—Houses, Glasllwch Farm estate; E. A. Middle, borough surveyor, Civic Centre.

Northampton. — Power house at sewage purification works (£30,742); Kottler & Heron, Ltd., Cliftonville.

Norwich.—Houses (160), Hall Road area; city architect, City Hall.

Oxford.—Flats at Rose Hill (36) and at Barton End (48), workshop block, classroom wing, etc., as first instalment of college for further education, and primary school on Wood Farm estate; E. G. Chandler, planning officer, Town Hall.

Penzance. — Flats (42), Prospect Place; borough surveyor.

Pershore.—New hostel block, laboratory and farm buildings, etc., with adaptations, at the Institute of Horticulture, Avonbank (£100,000) for Worcestershire C.C.; E. C. Harris & Partners, 3, Bedford Square, London, W.C.1.

Seisdon.—Houses (120), White Hill, Kinver; L. E. Tarpler, clerk to R.D.C., Council Offices, Wombourn, near Wolverhampton.

Tiverton.—Houses (350), Wilcombe Lane; H. S. W. Stone & Partners, architects, 20, The Crescent, Taunton.

Whaley Bridge.—Adaptation of Brookfield House to form new council houses; Cordingley & McIntyre, architects, Oxford Road, Manchester.

Whickham (Co. Durham).—Houses (244) at Swalwell Bank, for U.D.C.; Fennell & Co., architects, Bridge End Chambers, Chester-le-Street.

Wigston. — Two-storey flats (50), Dukes Close; Council's architect, Wigston, Leics.

Winchester.—Houses (102), Weeke estate; Brazier & Son, Ltd., builders, 303, Portswood Road, Southampton.

Wood Green.—Flats (18), Bury Road, and houses (23), Farrant Avenue; Artizans' & General Properties, Ltd., 1, Cromwell Road, S.W.7.